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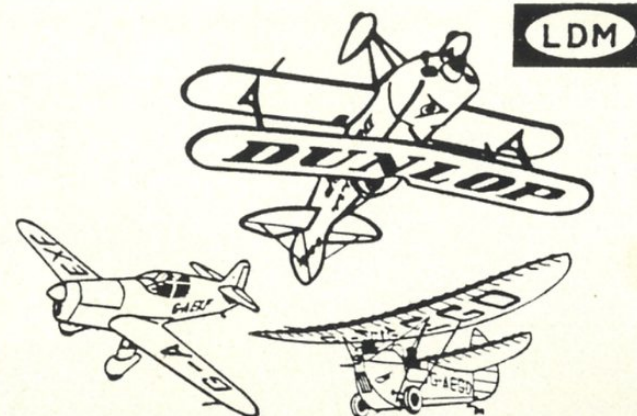


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PROGRAMME OF EVENTS

Saturday 7th: Meet-the-Author session with Chaz Bowyer and Ray Sturtivant.

Sunday 8th: Air Spotters Day with Alan Wright, and Aircraft Illustrated editors.

Saturday 14th: Meet-the-Author session with Roland Beamont with film and slide show.

Sunday 15th: Meet-the-Author session with Arthur Reed.

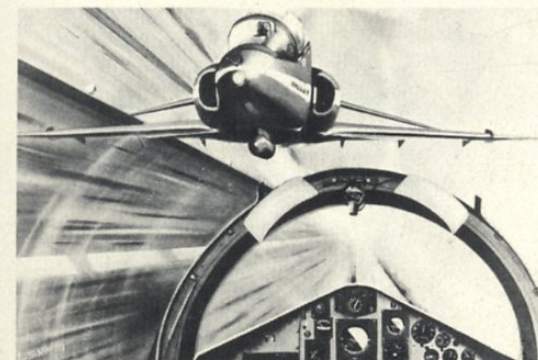
Saturday 21st: Meet the Aircraft Illustrated editors, Meet-the-Author session with Jeremy Scutts. Film of 1981 Greenham Common.

Sunday 22nd: Meet-the-Author session with Mike Garbett and Brian Goulding.

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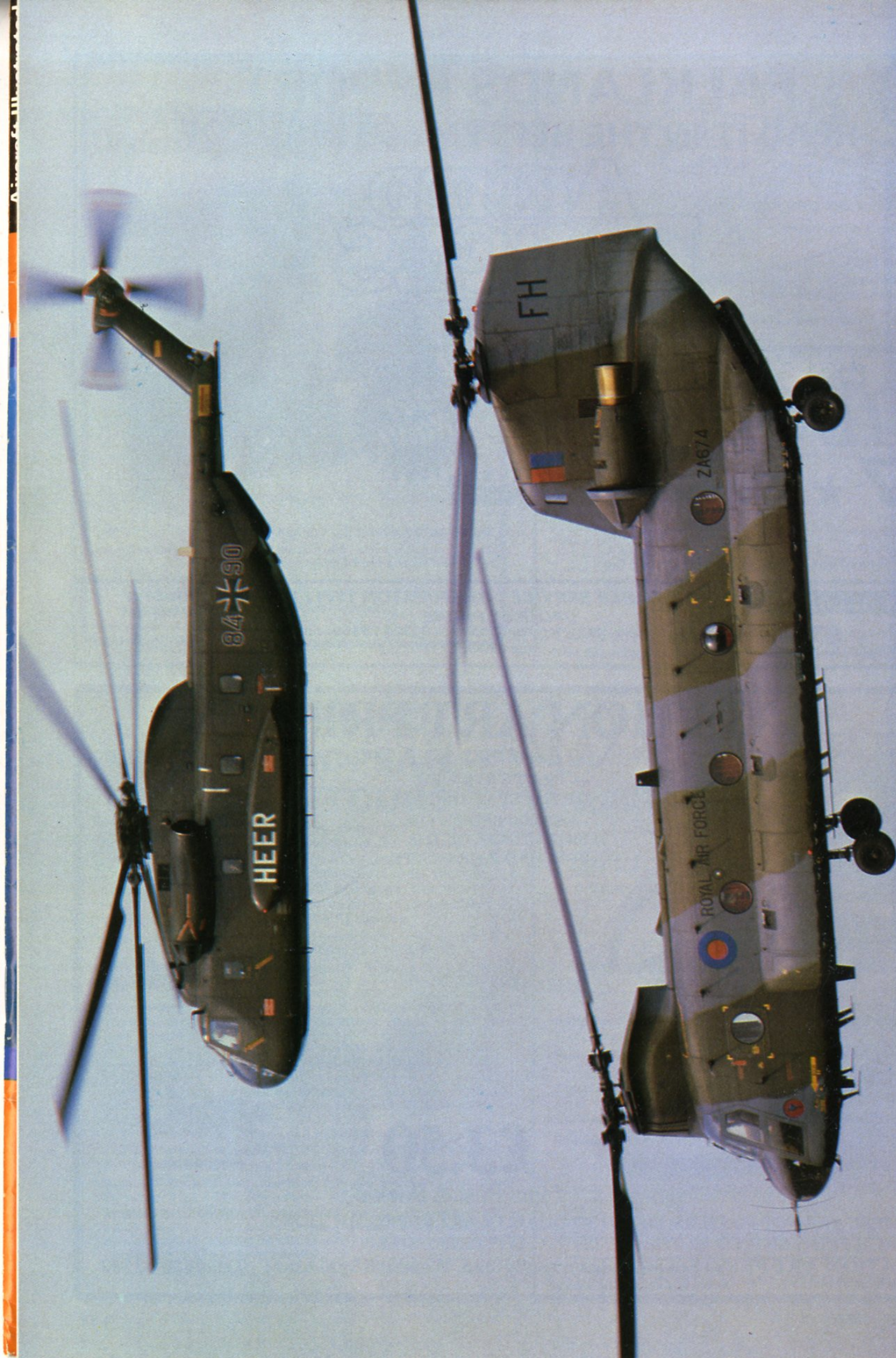
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aircraft illustrated

September 1982 Vol 15 No 9

This picture: A captured Argentine Agusta A109-A, AE334, painted up in Royal Navy markings and roundel with the title '846 Naval Air Squadron' on the nose, but retaining the Argentine roundel under the fuselage; the helicopter was photographed at RNAS Yeovilton on 13 July. A postscript to the Falklands conflict appears in an 'airview special' on pages 422-424. Photo: Peter R. March



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Cover: Re-engined with four CFM56 turbofans, the first srs 70 variant of the DC-8, N8093U of United Airlines, made its maiden flight on 15 August 1981. On pages 398-401 this issue, Martin Hedley describes the retrofit of the DC-8 srs 60 with the new engine and compares the performance of the new srs 70 to that of the older DC-8 variants.

Photo: McDonnell Douglas

Frontispiece: A CH-53G detachment from Heeresflieger Mittleretransportregimenten 15 based at Rheine-Benlage visited RAF Odiham between 7-14 June. During the deployment the helicopters took part in a training exercise at the Stanford battle area, Norfolk to which one of the CH-53Gs, 84+90, is seen en route in company with RAF Chinook HC1, ZA674, of No 240 OCU. Photo: Peter Gilchrist

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See us at Farnborough

A full range of Ian Allan Ltd aviation books and magazines will be on display at The Aviation Hobby Shop, Stand B10 — located between the junction of Canberra Way and Hinaiidi Way to the west of the static display — at SBAC Farnborough International 82. Public days for the event are to be held on 10-12 September — see page 410, this issue.

The Editor is pleased to receive contributions in the form of articles, letters and photographs (black and white prints and colour transparencies, but not colour prints). Items accepted will be retained and paid for at standard rates on publication; those he is unable to use can only be returned if they are accompanied by a stamped addressed envelope, otherwise they will be filed for possible future use.

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THIS MONTH, I have sharpened my quill to pen a few lines about Space — that place wherein the astronauts and cosmonauts whizz about in ever-so-slowly decreasing orbits.

What has brought on this sudden interest on the infinity of Space? Actually it was the recent announcement of the creation of a Space Command by the USAF. For many years, maybe half a century or more, there has been talk of warring nations using outer space as a battleground. The successful development of spacecraft and laser weapons during the past 20 years has brought the reality of space war very close. The task of this new Command, therefore, will be to rationalise and pull together all the current US space programmes. Space Command will rank equally with the USAF's Tactical Air and Strategic Air Commands which demonstrates most clearly that the space activities of the USAF now rank equal to those of its more conventional air war operations. Thus Space Command will assume overall control of all military space shuttle sorties and satellite operations and of anti-satellite weapons systems.

In parallel with the formation and activation — on 1 September 1982 — of this Command, USAF and Government top brass have called for additions to the existing fleet of four space shuttle orbiters. They believe that to stop production of these spacecraft would not only harm the nation's ability to have an effective space force if one or more of them were lost on the ground or on a mission, but that a whole lot of design skills and production techniques of use to the Command would be lost.

This really is a major step forward in national defence planning, one which only the US or the Soviet Union currently can take, but one which points unerringly to the potential battlefields of the future. Sadly, 'Star Wars' has come down from the silver screen to become, perhaps, in reality the sombre scenario for the 21st Century. And that's little more than 23 years away!

And so to bed

Now for something entirely different. Nightstopping in Cambridge — the county, not the town — I decided that it would be an ideal opportunity to pay yet another visit to Duxford. So what better or more convenient than to 'suss out' a hotel near to the airfield whereat the Duxford Aviation Society's splendid collection of civil transport aircraft stands cheek by jowl with the Imperial War Museum's squadrons of military types.

Happily I was directed to 12-bedroomed Highfield House in Duxford village where a courteous and efficient reception was received. My room was No 82. No 82? In a 12-bedroomed hotel? Mild surprise and confusion was further confounded when passing rooms numbered 66, 19 and 84. Had the owner bought up a job-lot of bedroom doors complete with numbers attached, one wondered? Had some night-stopping prankster switched all the little numerals on the doors?

All was revealed when reading a little leaflet about the hotel. 'Highfield House was built at the end of the 19th century. During the war Highfield House became the Headquarters of Commanding Officers of Duxford. To commemorate our association with famous squadrons we have named some of our rooms accordingly.' The leaflet also mentions Grp

Capt Sir Douglas Bader and his membership of No 242 Squadron of 'the famous Duxford Wing'. In fact, in addition to the room/squadron numbers quoted above there was also Nos 56 and 83 plus the 'Wing Commander's Room'.

Now, the yet further confusing thing about this system of room numbering is that, as any perspicacious ATC cadet will know, Nos 83 and 84 Squadrons flew bombers during the war and the nearest to Duxford that either of them was based was RAF Wyton in Huntingdon. Perhaps the owner is an ex-bomber boy; if so he has picked two squadrons which make odd, or perhaps 'contrasting' would be a better word, bed-fellows.

No 83 flew Hampdens, Manchesters and Lancasters, the latter in the Pathfinder Force, during the war; then Lincolns and pioneered the use of Vulcans after it. No 82 was based in the Middle and Far East from 1920 until disbanded in 1953 and flew Blenheims, Vengeances and Mosquitos in the war, changing to Beaufighters and Brigands when peace had broken out.

And why is there not a No 242 room? The hotel is being enlarged however and perhaps this famous squadron will be immortalised with one of the new rooms getting its number plate. Alternatively, the new suite of Stable Rooms, as they are called, could be named after some of the aircraft which flew from Duxford during the past 60 years. Spitfire, Hurricane, Snipe, Grebe, Siskin, Meteor, Javelin. Then what about the Squadron Commanders? Bader, Twisleton-Wykeham-Fiennes, Park, Crowley-Milling, Dundas.

Falklands postscript

Since the surrender of the Argentine forces in the Falklands one has heard and read all sorts of hair-raising stories about the discovery of napalm and dum-dum bullets, the lack of records regarding the location of minefields and the flagrant misuse of the white flag of surrender. But there have been other almost equally hair-raising anecdotes, some of which may be apocryphal, whistling along the grape-vine.

Among them possibly the most unsettling was the one about the little man from the MoD, scuttling about Britain's aircraft collections, looking for superannuated Gannet AEW3 airframes which could be refurbished and sent to the South Atlantic to provide enhanced radar cover of the Falkland Islands' western approaches, from where came the Skyhawks, Mirages and Super Etendards.

Now the story goes that the man from the Ministry was alleged to be seeking airframes, not aircraft. The clever twist was that 'someone had found' four Double Mamba engines in an 'as new' condition complete with the eight-bladed counter-rotating propeller units. These, so the story has it, had prompted the search for airframes to wrap around them, and a parallel search for the radar kit without which this Gannet variant was useless to the Task Force.

Now, whether it was the thought of having to face the mighty Gannet which caused the Argentines to start all that white flag-wagging or not is open to question. The thought of having to strap one on and get airborne could possibly have caused a lot of heart thumping among the pilots of Royal Navy squadrons I fear.

September Song

It's time for yet another Society of British Aerospace Companies Exhibition and Flying Display down in Hampshire. Or put another way the SBAC Saga is continuing to pull 'em in at Farnborough. See you there?

Falklands air losses to be replaced

The aircraft lost by the Royal Navy, RAF and Army during the Falklands conflict in the South Atlantic are to be replaced it was announced by the UK Secretary of State for Defence, Mr John Nott, in July. A further 14 Sea Harriers have been ordered, although only seven were destroyed in Falklands operations (three in accidents, four by ground-fire). The RAF is to receive three CH-47D Chinooks to replace those lost aboard *Atlantic Conveyor*. Mr Nott also said 'I intend to authorise immediately the placing of new orders for helicopters to replace losses during operations and also to strengthen our reserve holdings where necessary. We recently ordered five Sea Kings; this order will be increased to 16, eight in the ASW role and eight in the Commando role. In addition, we shall purchase three Lynx and up to five Gazelle'.

● During his speech Mr Nott re-affirmed the intention to go-ahead with the Anglo-Italian Sea King replacement, that will operate from the new Type 23 frigates for the Royal Navy.

BA 757s for Air Europe

An agreement has been signed between Air Europe and British Airways for the former carrier to acquire from Boeing two 757-200s previously ordered by the UK flag carrier. The cost of the two 757s is estimated to be \$70 million and the first will be delivered in March 1983, but is subject to resale to British Airways in spring 1987; the second aircraft, not subject to any resale, will be delivered in March 1984. British Airways will supply Air Europe with simulator facilities, spares and technical support but still under discussion is the provision of 757 maintenance.

As part of the arrangements, Air Europe will lease to British Airways one 757 and a number of 737s during the off-peak winter seasons 1983-4 to 1986-7. To enable Air Europe to fly a fleet of two 757s in the initial summer of 1983, British Airways has agreed to make available a second aircraft on a summer lease. This swap-lease of aircraft between the airlines is designed to maximise carryings during profitable summer months while minimising risk during the winter; an arrangement that Air Europe has pursued over the last two years with Air Florida.

Sweden approves JAS

The Swedish Parliament approved in June the JAS multi-role combat aircraft development and procurement contract — previously signed between the JAS Industry Group (Saab-Scania, Volvo Flygmotor, Ericsson, SRA Communications and FFV) and the Defence Material Administration (FMV) — that calls for delivery of approximately 140 aircraft by the year 2000.

One of the most important characteristics of JAS is the adaptation to the specific Swedish 'profile' in the air defence using ordinary roads as air bases as well as simple maintenance with turnaround service

handled mainly by conscripts. By use of new technology the JAS will be smaller and lighter than the Viggen yet offering an equal or better performance, with supersonic speed at all altitudes.

The Swedish JAS is adapted to a limited procurement and lifecycle-cost budget. About 30% of the JAS structure will be made of composites giving weight savings of up to 25%. Contributing to a small aircraft and outstanding manoeuvrability is also the use of fly-by-wire control systems.

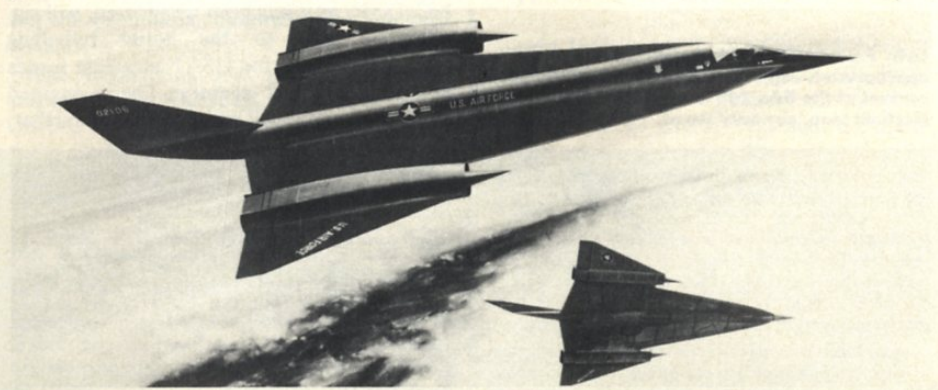
To power the JAS, the industry group has chosen the General Electric F404J, a more powerful version of the F404 low by-pass aug-

mented turbofan engine in the 18,000lb thrust class.

The JAS aerodynamic configuration uses a delta-wing combined with an 'all-flying' canard or nose-wing to improve manoeuvrability.

Certification for Jetstream 31

The Jetstream 31 was awarded its UK Type Certificate of Airworthiness (C of A) on 29 June, following a two year flight test programme covering some 900hrs as well as intensive ground and fatigue testing and a detailed investigation of Jetstream 31 by the CAA. Spearheading the flight test pro-



gramme has been the development Jetstream 31 which made its maiden flight on 28 March 1980. Converted from an earlier Jetstream and fitted with Garrett TPE 331-10 engines and advanced technology Dowty Rotol propellers, this aircraft has logged 625 development flights covering 794hrs. The first production Jetstream 31 joined the flight test programme after its first flight on 18 March 1982 and has made 77 development flights, totalling nearly 98hrs. This aircraft has principally been engaged in production verification flight testing.

BAe 146 news

The BAe 146 feederliner is to undertake 175hrs of intensive route flying in the hands of airline flight crews as it approaches certification later this year. Agreement has been reached for British Air Ferries, the

Left: The possible shape of things to come is illustrated in these concepts of an Advanced Tactical Fighter under study by the Lockheed-California Company. The fighter's role would be the defence of the US against enemy supersonic bombers but it would also have the capability to perform deep strike and air-to-air missions in any theatre. Resembling the Lockheed SR-71 Blackbird both in design and performance, the proposed ATF would use new advanced aluminium alloys that cost less than titanium. Drawing by Lockheed

NAEW Force activated

The NATO Airborne Early Warning (NAEW) Force was activated by NATO Secretary General Dr Joseph Luns at a formal ceremony at the NATO air base of Geilenkirchen, West Germany, on 28 June 1982.

Flanked by a Nimrod AEW3 sporting its new hemp camouflage and a Boeing E-3A in pale grey and white, Dr Luns uncased the flags of the Force and of the E-3A Component, which is to be based at Geilenkirchen. The Nimrod force is to enter service with the RAF next year and will be based at RAF Waddington. The E-3A Component is NATO's first multi-national flying unit and will have 30 aircrews from 11 of NATO's 16 nations. A total of 18 E-3As is planned for the Force, 12 of which will operate from Geilenkirchen with the remainder deployed to the Forward Operating Bases at Preveza in Greece, Trapani in Italy and Konya in Turkey, and the Forward Operating Location at Oerland in Norway. The first aircraft was delivered in February 1982 and the remainder will arrive at the rate of four/year. All the aircraft are registered in Luxembourg.

Three E-3As flying in overlapping orbits can provide NATO with complete radar coverage of central Europe extending into the Warsaw Pact territories. In his address, Dr Luns reminded his audience that the real potential of early warning aircraft could only be realised if they had the proper link with the commander on the ground. He said, 'It is this combination of aircraft "eyes" and ground "brain" which will allow NATO political and military authorities to follow more closely the movement of aircraft and other activities beyond our borders. This facility will improve our preparedness for defensive action. Since the Warsaw Pact will

be well aware of this fact, I believe we can see this as an additional stabilising factor in our relations with the Soviets'.

● Latest progress information on the Nimrod AEW3 development programme has been announced by British Aerospace.

The flight development programme covering aircraft performance and handling, radar, communications and navigation systems is currently being conducted with three development aircraft. A special communications trials aircraft was also used early in the programme. To date some 200 flights have been completed and over 700 flying hours accumulated. The communications trials aircraft (CTA) completed its programme in October 1980 and DB1, the first of the three development batch aircraft used for airframe work, has completed company trials and has been at A&AEE Boscombe Down since November last year for CA release flying. DB2, the second development batch aircraft, is the first aircraft to be fitted with mission system avionics, which have been developed by Marconi Avionics Limited. This aircraft

began radar trials at the end of May 1982. It is well up to the planned flying rate and the results obtained so far are encouraging. DB3, the third development batch aircraft which also has full mission system avionics, will begin its programme at the end of August after which it will also be used for CA release trials. At the conclusion of the flight development programme all three development batch aircraft will be completed to full RAF production standard.

Based on the current programme, the first of 11 Nimrod AEW3s is due to be delivered to the RAF in the latter half of next year and RAF crew training is planned to start towards the end of 1983, when the second production aircraft is due to be delivered. Nimrod AEW 3 aircraft will be based at RAF Waddington in England providing a further airborne element of the NATO Airborne Early Warning (NAEW) mixed Force.

Below: The NATO Airborne Early Warning Force's E-3A component, was formerly activated at Geilenkirchen, Germany on 28 June 1982. Photo: NATO/Wouter Langen



Southend-based airline, to carry out this flying which forms the final step towards the issue of the British type C of A: BAF announced in 1981 that it plans to acquire up to 10 BAe 146s.



The purpose of route flying is to ensure the safe operation of a new airliner when operated by airline personnel. Destinations are likely to include Beauvais, Jersey, Munich and Toulouse.

● The first BAe 146-200 feederliner has been rolled out and is now being prepared for its first flight. The aircraft will join the three -100 aircraft currently flying the development and certification programme. The -200 is 2.4m longer than the -100 which allows the maximum passenger capacity to be increased to 109. The first -200 has been painted in the colours of the American regional carrier Air Wisconsin and is appropriately registered G-WISC, the first -200 variant of the BAe 146 has been rolled-out at Hatfield (see 'airnews' item). Photo: BAe Hatfield

Left: Painted in Air Wisconsin colours and appropriately registered G-WISC, the first -200 variant of the BAe 146 has been rolled-out at Hatfield (see 'airnews' item). Photo: BAe Hatfield

RAF accident reports

Incidents involving a Phantom, Hunter and Jaguar on 9 December 1980, 23 February 1981 and 14 April 1981 respectively are the subjects of the latest summary reports released by the Ministry of Defence. The statements are as follows:

Phantom FGR2, XV414

Date: 9 December 1980. *Parent Airfield:* RAF Wattisham. *Place of accident:* 10 miles northeast of Lowestoft. *Crew:* Two. *Casualties:* Nil

Circumstances: On 9 December 1980, XV414 was one of a pair of Phantoms programmed for routine night air defence training. The sortie consisted of practice interceptions over the North Sea, with each aircraft flying alternately as the target and interceptor, under the control of a land based radar unit.

When flying as the target for the third interception, the crew of XV414 became aware that they had used slightly more fuel than expected but they attributed this to fairly protracted use of high power during the previous interception. XV414 completed one more full interception before the two aircraft separated and XV414 again became the target. While the ensuing interception took place, the crew — who had been monitoring the fuel state carefully — deduced that the fuel consumption was now nearly double that expected. They suspected that a fuel leak had developed, called off the exercise and announced their intentions to return to base for a precautionary landing.

The pilot advanced the throttles and began a climbing turn towards the coast, during which the right hand (RH) fire warning captions illuminated. The navigator noticed the reflection of a fire in the RH outer wing panel and the pilot shut down the RH engine in accordance with prescribed emergency procedures. As he was completing the shut down procedures, a left hand (LH) fire warning occurred. He throttled back the LH engine but the warning remained and the navigator confirmed that a fire had started on the LH side. The navigator attempted to make a distress call but the radio went dead and some of the cockpit lights went out. He saw that the aircraft was still burning, shouted to the pilot to eject and then initiated his own ejection. The pilot heard the navigator's ejection seat fire and ejected also.

The aircraft was abandoned at about 7,000ft and 350kts. The pilot and navigator last saw XV414 as it disappeared into cloud at about 5,000ft with a plume of flame emanating from the rear fuselage and leaving a trail of sparks behind it. The other Phantom had passed over XV414 a few minutes before the fuel leak was diagnosed. There were no external signs of any leak or a fire at that stage. Shortly afterwards, the crew of this aircraft saw two streams of vapour separated by plumes of flame emanating from the jet pipe area of XV414 as they closed with it. While attempting to establish radio contact the flames blossomed; the pilot transmitted that XV414 was on fire and ordered the crew to eject. There was no response. The pilot then made a distress call on behalf of XV414; his navigator later detected transmissions

from Personal Locator Beacons of the crew, which confirmed that they had ejected.

A search and rescue helicopter from RAF Coltishall recovered the crew of XV414 within 30 minutes. The aircraft crashed into the sea some 200 yards astern of a Trinity House vessel; seamen aboard launched a boat to search for survivors but only retrieved a portion of the aircraft's port outer wing.

Cause: Initially no significant wreckage was recovered despite extensive trawling operations occupying some 11 weeks. Seven months after the accident however, local fishermen found the crash site by chance and both engines, together with parts of the airframe, were subsequently salvaged. Examination of the recovered debris confirmed that a massive fuel leak had occurred, although the precise source could not be determined. Fuel leaking into both engine bays had ignited, probably by contact with local hot spots on an engine casing. This had caused an intense fire which led to the loss of the aircraft.

Although fuel leaks on the Phantom have not been uncommon, successive modifications have been incorporated to eliminate known problems. This was the first airborne fire in an RAF Phantom to have been caused by ignition of a fuel leak. An urgent study of the fuel system integrity was therefore undertaken and this has shown that a crack in the fuselage fuel tank compartment wall can lead to the rupture of the tank itself and that the resulting fuel leak would be remarkably similar to that which occurred in XV414. High priority is therefore being given to the embodiment of a modification which introduces a tank compartment lining to protect the fuselage tanks against this type of failure.

Hunter FGA9, XE552

Date: 23 February 1981. *Parent Airfield:* RAF Lossiemouth, Morayshire. *Place of Accident:* 20 miles north of Lossiemouth. *Casualties:* Pilot killed.

Circumstances: The pilot of XE552 was a student at the Tactical Weapons Unit (TWU). Towards the end of the course the syllabus progressively introduces the principles of Air Combat Manoeuvring (ACM). In the afternoon of 23 February 1981 the student was flying as the No 2 of a pair of Hunters, with a staff instructor leading, to practise ACM. There was broken stratocumulus between 2,000 and 4,000ft, and a thick haze layer to 7,000ft; above this the weather was good with a well defined horizon, excellent visibility and no significant cloud. The pair climbed out to the north of Lossiemouth in formation and then separated to begin the exercise. The aircraft turned towards each other, crossed at 18,000ft and pulled up with the student trying to get behind the instructor's aircraft. The instructor turned to the left and began a descending spiral; the student followed. At 15,000ft the instructor pulled out of the spiral and climbed back up before descending again. The student continued to follow and positions reversed with the student climbing up and the instructor descending. As the instructor levelled he saw XE552 above him starting a descent. The student entered a steep, wings level dive but did not appear to manoeuvre towards his adversary. The aircraft passed each other at 13,000ft, separated laterally by some 1,500yds. Although there was nothing obviously amiss, the instructor became alarmed at the flight path of XE551. The aircraft

appeared to be accelerating in a steep dive with the air-brake retracted and was rapidly approaching the minimum height briefed for the exercise — 10,000ft — stipulated for safety reasons. Thinking it possible that the student was experiencing control problems as a result of omitting to raise flaps, the instructor at first transmitted 'Check your flaps' but there was no reply; then, as the aircraft descended through an estimated 10,000ft, 'reduce your speed'. When there was no observed response, he ordered the student to eject. There was no apparent reaction from the student and XE552 continued its descent and dived into the sea. The instructor transmitted a Mayday call and searched the area of the crash until he had to return to base because of shortage of fuel. A rescue helicopter from Lossiemouth was at the scene within 15min but this and an RAF marine craft failed to find any trace of the pilot. Search and rescue operations continued until it was certain that the student could not have survived. Subsequent salvage operations yielded only small, insignificant pieces of metal.

KC-135R roll-out

The first USAF KC-135 tanker equipped with the new CFM56 turbofan was rolled-out on 22 June 1982 in ceremonies at Boeing Military Airplane Company (BMAC), Wichita, Ka. The KC-135 modernisation programme is one of the largest of its kind ever undertaken by the USAF. With the advanced technology CFM56 engines and other subsystem improvements, the KC-135R, as it has been designated, will significantly add to the aerial refuelling capability needed for USAF strategic forces well into the next century. The re-engined aircraft not only will carry more fuel farther,

providing one and a half times the fuel offload capacity of the present KC-135As, but also will have reduced maintenance costs, be able to operate from shorter runways and fully meet Federal noise and emission standards.

In addition to the new CFM56 engines, nacelles and struts, the KC-135R provides a number of other system improvements, including a new electrical generator system, an auxiliary power unit for self starting, a strengthened main landing gear, improved nose wheel steering, anti-skid brakes, a larger horizontal stabiliser, and related modifications to the cockpit controls and displays and the pneumatic, hydraulic and autopilot systems.

The engineering and development programme of the KC-135R has been a shared US/French effort established by a joint memorandum of understanding. Current plans are to integrate the re-engining of the C-135R aircraft used by the French AF into the ongoing USAF production programme. The first USAF KC-135R production aircraft will be delivered to SAC in mid-1984, with the first French aircraft scheduled for mid-1985.

Current USAF plans as included in the five year defence plan are to re-engine over 30 KC-135 aircraft through fiscal year 1984-1988 at a cost of over \$6 billion.

New Super 80 variant

A higher gross weight version of the McDonnell Douglas DC-9 Super 80 twin-jet that provides added range and take-off performance has been certified by the US FAA. The aircraft, to operate at 149,500lb (67,812kg) maximum take-off gross weight, is the third major variant of the Super 80. It is designed to provide a range increase with full payload of up to 500nm (927km) and this will bring the Super 80's range with maximum payload to 2,000nm (3,707km).

To meet other mission requirements, McDonnell Douglas is also studying new versions of the Super 80 that would operate at approximately 160,000lb (72,576kg) maximum take-off gross weight.

●

HM The Queen has approved the following RAF appointment promotions: ACM Sir Michael Beetham, GCB, CBE, DFC, AFC, AIR ADC is to be promoted to the rank of Marshal of the RAF on 15 October 1982.

ACM Sir Keith Williamson, GCB, AFC is to be Chief of the Air Staff from 15 October 1982, in succession to ACM Sir Michael Beetham. This appointment carries with it membership of the Defence Council and of the Air Force Board of the Defence Council.

●

Four Piper Navajo Chieftains have been sold to the Finnish AF to be used for transportation and photographic duties. The aircraft will be delivered by December and the Air Force has also taken out an option to buy two more Chieftains in 1983.

●

An infra-red jammer has been designed and built by BAe Dynamics Group Bristol Division to protect helicopters operating in forward battle areas from attack by surface-to-air heat-seeking missiles. Trials have begun to assess its effectiveness against infra-red homing heads fitted to ground-to-air missiles.

●

Final assembly work on the first production Mirage 2000 for the French AF is now being carried out at Dassault-Breguet's Bordeaux-Mérignac plant.

●

SEPTEMBER 1982

airnotes

The 100th Fokker-assembled F-16 was officially handed over to the RNethAF on 14 June. The service has received 62 F-16s (49 'A' single-seaters and 13 'B' two-seaters) while the remaining 38 aircraft have been delivered to the Norwegian AF (31 'A's and 7 'B's). Fokker began F-16 assembly in 1978 and is halfway through current orders for the fighter, production of which will continue until at least 1986.

●

Florida Institute of Technology's School of Aeronautics took delivery of 10 Piper Warriors and three Piper Arrows on 15 June. The 13 aircraft represent the initial portion of an order for 40, comprising 34 Warriors and six Arrows, which will be used in both primary and advanced flight instruction.

●

Beech Aircraft Corporation has announced the successful first flight on 14 June of a new, experimental, pressurised single-engine jetprop-powered aircraft. The company has released no further details of the type other than it is now undergoing an experimental flight test programme.

●

Simmons Air: Based at Marquette, Michigan, the airline operates a route network linking 13 cities in Michigan, Wisconsin and Illinois, with hub centres at Chicago and Detroit. A fleet of Piper Navajos and Bandeirantes is currently utilised and the latter type will be replaced by the 36-seat Shorts 360. The 360, which made its first flight in June 1981, is now well into its flight development programme, with full certification targeted for September and first deliveries for November this year.

●

THY: (Turk Hava Yollari) The confirmation of a previously unannounced order. The first aircraft in the purchase was delivered to the Turkish airline on 16 June; the other three are scheduled to be delivered one each month through September. THY operates scheduled services from Turkey to European and Middle Eastern cities. The company has taken delivery of six 727s from Boeing since 1974.

●

China Airlines: The carrier will use its A300 B4-200 on South East Asian routes to Hong Kong, Bangkok, Seoul and Okinawa. Eventually China Airlines will use A300s — it has three more ordered for delivery this year and 1983 (see Sep 81, p 392) — throughout its whole regional network.

●

Comair: See 'Airliner Orders' entry, this issue.

●

Eurotrag: The Libreville, Gabon-based operator has purchased its second Twin Otter -300 to ferry supplies and personnel to railway building sites in support of railway construction.

●

Pelita Air Services: See 'Airliner Orders' entry, this issue.

●

Rio-Sul: The first of three secondhand Fokker F27s purchased by Rio-Sul was put into operation in June.

●

THY: (Turk Hava Yollari) See 'Airliner Orders' entry, this issue.

●

Key: n.d.=no details, e=early months of year, f=firm orders, o=options, * =see notes.

Airliner Orders

Airline	Aircraft	No	Ordered	Delivery date
Air Europe*	Boeing 757-200	2	2 Jul 82	Mar 83 & Mar 84
British Caledonian Helicopters*	Bell 214ST	3	1 Jul 82	Sep, Oct & Nov 82
Comair*	Shorts 330	2	28 Jun 82	(see notes)
Pelita Air Services*	DHC Dash 7	3	29 Jun 82	(see notes)
Royal Air Maroc*	Boeing 737-200C	2	8 Jul 82	Mar & Jun 83
Simmons Air*	Shorts 360	2-f	16 Jun 82	n.d.
		2-o	16 Jun 82	n.d.
THY*	Boeing 727-200	4	8 Jul 82	(see notes)

Notes

Airliner Orders

Air Europe: See 'airnews' item, this issue.

British Caledonian Helicopters: The 20-seat, twin-turbine helicopters will be used for offshore oil support in the North Sea. The 214ST has a range of 407nm using maximum fuel with VFR reserves at 4,000ft. Normal cruise speed is 140kts.

Comair: The Cincinnati-based regional airline will use the Shorts 330s to replace Bandeirante and Chieftain aircraft on its Cleveland to Dayton and Detroit routes. The 330s were delivered at the beginning of June and the purchase brings total orders and options for the type to 111 aircraft to 34 operators 14 countries; to date 86 have been delivered of which 54 are flying scheduled services in the US.

Pelita Air Services: The first Dash 7s for the Indonesian-based airline. The initial example was accepted at recent ceremonies in Toronto and will arrive in southeast Asia late this summer following installation of 'customised' avionics equipment. Pelita will take possession of its other two Dash 7s late this year. The aircraft will be employed in a variety of transport activities and the \$30 million sale includes the optional cargo-conversion kit offered by the manufacturer.

Royal Air Maroc: Valued at \$33 million, the aircraft will be RAM's first convertible passenger/cargo models of the 737. The airline currently operates four all-passenger 737s as well as two 707s, eight 727s and one 747. Announced sales for Boeing 737s now stand at 1,002 aircraft.

Simmons Air: Based at Marquette, Michigan, the airline operates a route network linking 13 cities in Michigan, Wisconsin and Illinois, with hub centres at Chicago and Detroit. A fleet of Piper Navajos and Bandeirantes is currently utilised and the latter type will be replaced by the 36-seat Shorts 360. The 360, which made its first flight in June 1981, is now well into its flight development programme, with full certification targeted for September and first deliveries for November this year.

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Airliner Deliveries

Airline	Aircraft	No	Delivered	Date ordered
China Airlines*	Airbus A300 B4-200	1	22 Jun 82	May 81
Comair*	Shorts 330	2	e-Jun 82	(see notes)
Eurotrag*	DHC Twin Otter-300	1	5 Jul 82	n.d.
Pelita Air Services*	DHC Dash 7	1	Jun 82	(see notes)
Rio-Sul*	Fokker F27	1	Jun 82	n.d.
THY*	Boeing 727-200	1	16 Jun 82	(see notes)

Notes

Airliner Deliveries

China Airlines: The carrier will use its A300 B4-200 on South East Asian routes to Hong Kong, Bangkok, Seoul and Okinawa. Eventually China Airlines will use A300s — it has three more ordered for delivery this year and 1983 (see Sep 81, p 392) — throughout its whole regional network.

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Eurotrag: The Libreville, Gabon-based operator has purchased its second Twin Otter -300 to ferry supplies and personnel to railway building sites in support of railway construction.

Pelita Air Services: See 'Airliner Orders' entry, this issue.

Rio-Sul: The first of three secondhand Fokker F27s purchased by Rio-Sul was put into operation in June.

THY: (Turk Hava Yollari) See 'Airliner Orders' entry, this issue.

Key:

n.d.=no details, e=early months of year, f=firm orders, o=options, * =see notes.

James Goulding

A rare Swedish subject

The Saab 32 Lansen was designed during the early-1950s as a multi-role transonic aircraft, performing in earlier years much the same function as the supersonic Viggen of today. Looking like the result of a union between a North American F-86 Sabre and a Lockheed P-80 Shooting Star — with a hint of Supermarine 535 mixed in as well — the Lansen was developed into three versions: the A-32A attack aircraft, the J-32B all-weather fighter and the S-32C photographic reconnaissance aircraft. The Saab 32 was the first Swedish aircraft to achieve Mach 1 and ultimately 450 examples of all versions were built. The first deliveries to the RSAF were made during 1955.

As a kit subject, the Lansen is not the type of aircraft that would appeal to the major kit manufacturers. Fortunately for modellers Heller has frequently shown courage in its choice of subject for kits, preferring to offer an interesting selection of types instead of merely concentrating on financial success. It was therefore a welcome surprise when Heller announced its 1:72 scale kit of the Saab 32 Lansen.

Heller's model is a good replica, and the kit has parts to permit the modeller to produce either the A-32A or the S-32C photo reconnaissance aircraft. The box art shows the A-32A featured on the decal sheet, but it has a large ventral bulge which is not included in the model.

The cockpit has good detail, with engraved instrument panels and well modelled seats. The side console panels also have engraved instruments.

Other very good points are the detailed undercarriage legs and the engraving on the inner faces of the undercarriage doors.

The front fuselage has a large cut-out section into which can be cemented either the continuation section for the fighter/attack versions or the transparent camera section for the photo reconnaissance type. While the former variants have the cleanest contours, the reconnaissance nose is the more unusual.

It is disappointing that the attack weapons and the wing pylons are not included in the kit, and which should be a feature of the A-32A variant. It would have been nice, too, to have had pylons and Sidewinders for the J-32B fighter. As it is, the S-32C is probably the most interesting model if made up straight from the box.

Two Lansens feature on the transfer (decal) sheet; one is an A-32A from Flygflottilj 17 and the other is an S-32C from Flygflottilj 11.

This is a very welcome kit and it costs £2.95. Our sample was kindly supplied by Humbrol Limited.

Matchbox' Seasprite

As a basic design the Kaman Seasprite multi-role helicopter is now quite old, having flown in prototype form in July 1959. Deliveries of the initial production version, the UH-2A, began 20 years ago, but in those days it was powered by a single T58-GE-8B engine: all these early deliveries were subsequently rebuilt as twin T58-GE-8F engined versions known as the UH-2C and these entered service in 1967. The production Seasprites have been progressively modified into more advanced versions, the latest being the specialised anti-submarine Seasprite designated SH-2F. It is surprising that although the Seasprite has been in service for over 20 years, it is only comparatively recently that any interest has been shown in the type by the kit manufacturers. Matchbox has now released a 1:48 scale model of the Seasprite SH-2F.

Whereas some aircraft subjects are rather uninteresting, there are others that have instant appeal. This is of course all a matter of personal taste and what may thrill one person will leave another quite unmoved. Although it is a truly beautiful aeroplane, in my opinion the Concorde is too perfect a shape to be an interesting modelling subject. Conversely I find the Seasprite is a fine subject, being a 'chunky' design with all sorts of external oddments, so much the result of modifications over the years. The original design was undoubtedly 'clean' but making it into an effective helicopter has resulted in many external additions such as radar, weapons, tank and MAD.

Moulded in green, grey and black, Matchbox' Seasprite is typical of the company's

approach to kit design. Apart from the two fuselage halves the rest of the model is built up from smaller items.

The cabin interior has a radar operator's position, with a detailed console, and a sonobuoy discharger unit. The pilots' cockpit has seats, control columns, instrument panel, central pedestal and seat-raising levers. Figures are included for the two pilots and the radar operator.

The doors on each side of the cabin slide in rails, and here words of criticism must be said. One feels that on a model of this scale it should have been possible to make the rails more delicate and closer to scale and for the parts to fit better than they do. When closed the doors should be flush with the forward part of the fuselage. As with many Matchbox models surface detail tends to be limited as a matter of policy, and detail on the fuselage is confined to a few indented lines. The rotor heads on main and tail units have adequate detail, if somewhat simplified. The model carries a torpedo on the port side rack and a long-range tank is carried on the starboard side.

An excellent decal sheet gives markings for two Kaman SH-3Es. One is from HSL-32, Detachment 5, on USS *Valdez*, US Atlantic Fleet, the other is from HSL-37, based on USS *Rathburne*, US Pacific Fleet. A fine markings instruction sheet, with informative double general arrangement drawings of the Seasprites, is included.

Matchbox' Kaman SH-3F Seasprite costs £3.25.

A Noratlas

The French counterpart of the Fairchild C-82A Packet was the Nord 2501 Noratlas, and designed to carry out the same functions, it bore more than a passing resemblance to the American military transport. Both were twin-engined, high-wing monoplanes, with twin-boom fuselages to facilitate rear loading of the central cargo-carrying fuselage. Both had twin fins and rudders, and they were very close in overall size.

Heller has produced a splendid 1:72 scale kit of the Noratlas, capable of being modelled in one of three versions. These differ in fin area, windscreen design and other smaller details. This is a beautifully produced kit, with excellent detail and external engraving of the usual Heller high standard. The internal detail inside the central cargo fuselage is impressive, with frames and stringers, as well as a convincing floor. The cockpit area also looks very realistic, with extensive engraved detail on the cockpit panels. The entrance doors, and particularly the rear-loading clam-shell doors have good detail. The whole central fuselage is, in fact, a special feature of the complete model, and it should certainly be exhibited

with the doors open. The undercarriage units and their doors continue the standard of detail.

A high-quality decal sheet gives markings for no less than six individual aircraft — three French, one Greek, one German and one Portuguese.

This is a very fine model of a lesser known, but much used transport. It is, therefore, a worthy addition to our collections of postwar aeroplanes.

A set of Sea Kings

The Falklands conflict brought into prominence a number of aircraft types, one of which was the Westland Sea King helicopter. The Sea King served with distinction and although five were lost during operations this was attributed to the large number of sorties flown in the atrocious weather conditions of the South Atlantic. One of the most dramatic and heroic incidents in which the Sea Kings were involved was the rescue of troops and crew from the fiercely-burning RFA *Sir Galahad* after it had been bombed by an Argentine A-4 Skyhawk. The news film of the helicopters hovering dangerously close to the ship and disregarding the danger of exploding ammunition, was unforgettable.

Bearing this in mind, there will be many modellers who will wish to construct kits of the Westland Sea King in its various forms, and a fine series of 1:72 scale models is available from Fujimi. Four versions of the basic Fujimi kit are produced: the first represents the Westland Sea King HAS 2 anti-submarine warfare (ASW) variant and the Sea King HAR 3 rescue helicopter. The next model is similar to the above, but has West German and Belgian AF markings, under the designation of Sea King Mk 41. With the Japanese market in mind, the third kit is boxed as a Sikorsky HSS-2B, the Mitsubishi licence-built version of the helicopter and operated by the Japanese Marine Self-Defence Force. The fourth example is marketed as a Sikorsky SH-3H Sea King of the US Navy.

A distinguishing feature of the Westland Sea Kings is the prominent radome mounted aft of the rotor, and this is included as a separate component in the applicable kits. Other features of the Westland variants are the hemispherical look-out windows at the rear of the cabin and the six-bladed tail rotor on certain versions.

The basic fuselage, common to all these kits, has window positions with thinned areas so that the modeller can cut out the window openings which apply to the particular subject being constructed.

The fuselage shape and external engraving is excellent, the latter consisting of a mixture of fine raised lines, rivets and indented panel lines. The general fit of parts reflects the overall high standard of these kits.

The internal arrangement of the cabin and cockpit vary according to the role of the subject and the degree of detail enhances these Sea King models. The anti-submarine version has additional crew seats and instrument consoles in the cabin together with a bench seat, sono-buoys and stowage for the 'dunking' sonar unit, which is also included.

The sonar equipment is discarded in the 'rescue' model, which has two cabin bench seats. A winch unit is mounted above the large main door, which is a separate component and can be cemented open to reveal the cabin interior.

The cockpit area is similar on all the models and has seats, control columns and instrument panels, for which decals are provided. Aircrew figures are not included, but there are plenty of these available from other kits if required.

Two Mk 44 and two Mk 46 torpedoes are included for mounting on the fuselage of the anti-submarine versions. A fuel tank can be mounted in place of one of the weapons. A usual mix of weapons comprises torpedoes for deep water attack against submarines and depth charges for shallow water use. The ASW type also carries a Magnetic Anomaly Detector (MAD) in the rear of the starboard undercarriage pod. In the same type smoke marker buoys are carried (in their launcher), in the port undercarriage pod.

The Sikorsky HSS-2B kit gives markings for an ASW version of the Japanese Marine Self-Defence Force and special duties transport type of the JMSDF Flying Department.

The Westland Sea King Mk 41 kit gives markings for helicopters of the West German Navy and another, with six-bladed tail rotor, of the Belgian AF.

The Westland Sea King HAR3 kit gives markings for a Royal Navy HAS1 and an RAF HAR3. As both five and six-bladed tail rotors are included in the kit, the Royal Navy HAS2 is a possible modelling subject — the six-bladed rotor distinguishing this variant from the HAS1.

If other markings are desired, the Modeldec range of transfer (decal) sheets can be a good source. Sheet No 49 gives a selection of Royal Navy Sea King HAS1 and 2 markings from Nos 706, 819, 820, 824 and 826 Squadrons. Sheet No 45 is for a Sea King HAS50 of the Royal Australian Navy (No 817 Squadron), while Sheet No 57 has alternative markings for a Sea King HAR3 of No 202 Squadron, 'A' Flight (two aircraft). Sheet No 9 has markings for a Sikorsky SH-3A from USS *Randolph*.

These are available from Modeltoys of 246 Kingston Road, Portsmouth.

These Fujimi Sea King kits give an almost complete combination of components to permit the modeller to produce any of the major variants, with the exception of the Westland Commando Mk 2. Even this version of the Sea King does not present the conversion enthusiast with any problems because the major alteration lies in the design of the main undercarriage. In the Commando Mk 2 the float-like undercarriage pods (which become stabilising floats in any alightment on the sea) are discarded in favour of a simple fixed undercarriage arrangement. The dorsal radome is also absent from the Commando variant of the Sea King.

Our samples of these excellent kits were kindly supplied by A. A. Hales Ltd of Hincley, Leics. The models cost £4.99 each and although rather expensive they build into beautiful replicas of the Sea King.

Deadly Duo — the B-25 and B-26 in WW2 by Charles A. Mendenhall, published by Speciality Press* (159pp illus text) at £10.95

'Deadly Duo' is a photographic review covering two of the US medium bombers of WW2 — the North American B-25 Mitchell and the Martin B-26 Marauder. A special feature is the detailed drawings of the aircraft (useful for modellers) and the 'Data Directory' sections which provide specifications as well as performance and production information for each variant of the two types. The story is written in a style that will not necessarily suit everyone's taste.

*Distributed in the UK and Europe by Midland Counties Publications

32nd Tactical Fighter Squadron Operations by P. E. van Oest, published by Military Publications International (48pp illus text colour throughout) at Dutch fl15.00 (plus Dutch fl2.60 p&p)

As indicated by the title, this publication is concerned with the many operational tasks of the 32nd TFS, USAF — an F-15 Eagle-equipped unit based at Soesterberg AB, Holland. A brief history of the squadron is given accompanied by a detailed account of a typical air combat training sortie flown by the F-15s. An outstanding feature of the book is the colour photography that provides a pictorial insight into life in an operational squadron.

*Available from: Military Publications International, PO Box 260, 3940 AG Doorn, the Netherlands

The First Pathfinders by Kenneth Wakefield, published by William Kimber (256pp illus text) at £9.75

Carrying the sub-title 'The Operational History of Kampfgruppe 100 1939-1941', this book concentrates on the history of one of Germany's best known bomber units, when it was tasked with pioneering the vital role of 'pathfinding' — the illumination of a target area by incendiary bombs dropped by a special force as a forerunner to an intense bombing raid. A systematic blow-by-blow account of the unit's operations over the UK is given with information on its achievements and losses.

The Defence of the Reich — Hitler's nightfighter planes and pilots by Werner Held and Holger Nauroth, published by Arms & Armour Press (232pp illus) at £9.95

Illustrated by over 500 photographs, 'The Defence of the Reich' presents a vivid pictorial history of the German nightfighters that fought to defend the cities and factories of the Reich from British and American bombing raids during WW2. In order to provide background to the photographs, and to place them in their correct historical perspective, each chapter opens with a brief introduction.



Left: A pair of Saab S-32C Lansens from Flygflottilj 11 of the Swedish AF. An aircraft from this photo reconnaissance unit is one of the subjects that can be modelled from Heller's new 1:72 scale kit of the type. Photo: Flygvapnet via John Huizing

THE VENERABLE Lockheed T-33A 'T-Bird' ended its 32-year career with the Italian AF on 31 March 1982, when the last two examples belonging to 651^a *Squadriglia Collegamento e Traino Bersagli* (liaison and target towing flights) flew from Istrana AB, Treviso home of 51^o *Stormo*.

The T-33 first entered service with the *Aeronautica Militare Italiana* (AMI) in the early-1950s, when the A-10-LO variant was used by the Basic and Advanced Jet Aircraft School, *Scuola Volo Basico Avanzato Aviogetti*, in order to replace the ageing Venom Mk 50 and Vampire NF-10. The T-33A served with distinction in this role until 1964 when it was progressively replaced by the Fiat G-91T-1, and was transferred to liaison squadrons. Here it carried out many duties including instrument flight training, target towing and acting as an intercept target for practice night sorties by F-86Ks; the latter two missions were generally flown by the AMI's RT-33A variant of the 'T-Bird' with that aircraft's reconnaissance role undertaken by RF-84Fs. An additional task carried out by some specially modified T-33As was the calibration of the TACAN system, used by the AMI's Starfighters for navigation.

In 1980 the T-33A began to be withdrawn from the liaison squadrons, being replaced by Aermacchi MB-326As that were transferred from the Primary and Basic Jet Aircraft School — *Scuola Volo Basico Iniziale Aviogetti* — at Galatina. The 'A' variant of the MB324 is not a favourable replacement to carry out the duties of the RT-/T-33A because of its limited instrumentation that does not allow flights in low visibility conditions. This situation, however, will be improved when the MB-326E variant will join the liaison squadrons following its replacement as a basic trainer by the new Aermacchi MB-339A.

The last T-33A squadron, 651^a, kept its 'T-Birds' flying by using parts from grounded examples, but the lack of firing cartridges for the Martin-Baker N-U5 ejection seat eventually forced the type's retirement. To commemorate this ending of an era, a final flypast was organised by 51^o *Stormo* at Istrana AB. The programme included the last mission by T-33As 51-88 serial 51-9249 and 51-85 serial 55-3080, a formation take-off by four F-104s of 155^o *Gruppo*, *Caccia-Bombardieri* (fighter-bomber) and four F-104S' of 22^o *Gruppo*, *Caccia-Intercettori* (fighter-interceptor).

The T-33As were flown by Maj R. Bordigato and Maj M. Alessi respectively and after acting as a 'target' for the F-104S' completed a brief aerobatic display before landing for the last time. However, the two aircraft will be kept by the AMI: 51-88 is to go to the Aeronautical Museum at Vigna di Valle, while 51-85 will be sent to Rivolto AB, where it will probably become a 'gate guardian'.

Acknowledgement: The author is grateful to the Public Relations Department of the Italian AF and to the Commander of 51^o *Stormo* for all the facilities given while preparing this article.



ITALIAN AIR FORCE RETIRES THE 'T-BIRD'

Antonio Palma



Left: As can be surmised from its nose code, T-33A, 52-9898 was assigned to 5^o *Stormo* where it served with 605^a liaison flight.

Below: The modified nose of the RT-33A variant of the 'T-Bird' is evident in this view of 36-65. These aircraft carried a distinctive colour scheme with the upper surfaces finished in orange and the under surfaces painted in yellow with black stripes.

Bottom: One of the last AMI units to retire the 'T-Bird' was 604^a *Squadriglia Collegamenti* of 6^o *Stormo*.



Top left: Italian AF (AMI) Lockheed T-33A of 605^a *Squadriglia Collegamenti*, liaison squadron, climbing away after carrying out an overshoot at Rimini AB, home of 5^o *Stormo* Caccia. The last unit to operate the 'T-Bird' in AMI service was 651^a belonging to 51^o *Stormo* based at Istrana AB.

All photos by the author unless otherwise credited

Above: This T-33A was unusual in that the aircraft code comprised solely the last three digits of its serial, as opposed to the more common practice of preceding this number with that of the *Stormo*; '484' was operated by 603^a *Squadriglia Collegamenti* of 3^o *Stormo*.

Left: Nose details of RT-33A, 51-76, from 651^a, the liaison and target towing flight of 51^o *Stormo* — the last AMI unit to operate the type. Note the absence of camera equipment from the modified nose of the RT-33, which was removed after the aircraft had been superseded in its reconnaissance role by RF-104Gs. '51-76' is now a 'gate guardian' at Istrana AB. Photo: Toselli-Grattoni



Re-engining the DC-8

Martin Hedley describes the retrofit of the DC-8 srs 60 airframe with the new CFM56 fanjet

PROBABLY the largest commercial aircraft retrofit programme is currently under way at the McDonnell Douglas plant in Tulsa, Ok. This is the re-engining of DC-8 srs 60 aircraft with the new CFM56 fanjet. Under the management of Cammacorp, major companies involved in the programme are CFM International, McDonnell Douglas and Grumman Aerospace. The benefits to airline operators of the re-engined aircraft are impressive, particularly the reduced capital cost of obtaining an efficient airliner that meets the noise requirements of the US, effective 1 January 1985.

Before the programme started both General Electric and SNECMA knew their CFM56 engine would suit a JT 3 replacement programme for the Boeing 707 and Douglas DC-8. The former companies are both engine manufacturers having no indigenous expertise in aircraft rework, nor any facilities in which to make the modifications and indeed neither corporation wanted to enter the airframe business. There was also the considerable financial risk to consider, and so a managing agency was sought and the organisation chosen was Cammacorp Inc, backed by performance guarantees for the benefit of those companies contracting with Cammacorp.

Cammacorp has existed since early-1977, based in El Segundo, Ca and has a very interesting personnel policy. Many of its employees have been drawn from the retirement rolls of large aerospace companies and among the many advantages this offers, staffing flexibility suits the relatively short term nature of company programmes. Not

only do these people have considerable breadth and depth of aviation knowledge, but having retired they are interested in a substantial challenge without the worries of climbing the corporate ladder. Of Cammacorp's management team, 16 out of the 33 personnel have in excess of 35 years' experience in their own field and their backgrounds cover all the US aircraft manufacturers, the USAF and USN, together with five major World airlines. So without doubt about its own potential, Cammacorp set about determining airline interest in re-engined DC-8s, whether the project could be handled economically and if so, by whom.

Several airlines expressed an immediate interest in the programme and discussions took place with operators of the 243 srs 60 and 90 srs 50 aircraft. Larger fleet airlines were impressed with the low capital cost and substantial benefits returned and the smaller fleet operators also saw the possibility of extended range, improved performance and flexibility of operation allowed by the fitting of CFM56s and auxiliary power units (APUs). The current Pratt & Whitney powered DC-8s will become obsolete by virtue of fuel costs and noise legislation, yet some of the airframes are now only 10 years old. DC-8s have been designed by the Douglas Aircraft Company to have a service life of 100,000 flight hours and so a retrofit programme appeared to be economical in terms of aircraft life and availability.

In choosing a manufacturing plant to base the programme on, two items in particular recommended the McDonnell Douglas facility in Tulsa, Ok. Firstly it had experience in aircraft modifications on both civil and military types and secondly, the plant was a part of the organisation that built the DC-8s in the first place and they had the most

expertise on the aircraft. Other items of advantage were that the docks were already available, and that Tulsa is a primary manufacturing city.

The well known FAR part 36 noise regulations precludes the operation of present DC-8s after the mid-1980s and yet some of the airframes will be good through to the 1990s. Economic reasons alone for the retrofit appear justification enough for this programme, but to these may be added the improvement in performance, opening up more airports to the DC-8. The major modification is the engine replacement but Cammacorp also offers the option of single or dual APUs, previously absent from the aircraft. An important improvement within the cabin will be reduced engine noise, which can be quite excessive at take-off and touchdown in the stretched DC-8 of today. One more option offered at retrofit time is improvement of the cabin air conditioning system by the replacement of four turbo-compressors, two freon compressors and the addition of two air cycle machines as used on current narrow body airliners. Nearly all orders received so far include the new air system.

The DC-8 srs 70 solution to early obsolescence guarantees noise level compliance with room to spare and most importantly without power cutback or trade-offs. Fuel burn will be reduced by 25% which will bring seat-mile costs down to the levels of new aircraft being offered today. The total fuel requirement should therefore reduce by between 1million-1.5million US gal/aircraft over the current fleet. Capital cost of fleet replacement is reduced substantially while the increased service life will enable airlines with DC-8 srs 70s to delay obtaining large scale financing at a time when interest rates are so high.

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Top left: Powered by four CFM56 turbofans, DC-8 N8093U of United Airlines made its first flight as a srs 70 aircraft from Tulsa on 15 August 1981.

Left: United Airlines' second DC-8 modified to srs 70 standard was N8092U, seen just prior to touch down at Chicago O'Hare airport. Photos: United Airlines

The following figures were produced by Cammacorp in 1978 for discussion with the airlines; they consider two cases the first (A) of which assumes a new fleet of Boeing 747s to replace capacity, the second (B) a mixed fleet of new Boeing 747s and refitted DC-8s.

Case	A	B
DC-8	0	20
Boeing 747	11	7
Total aircraft	11	27
Total seats	4,200	6,860
Total cost	\$580M	\$550M

From these figures it is clear that for around the same capital outlay a larger more flexible fleet is available to a current DC-8 owner.

Where would a re-engined DC-8 fit in the fleet plans for the 1990s and beyond? Consider the 210/250 seat DC-8 srs 70 with its extended range up to 6,400 miles and then compare the other similar capacity aircraft on offer today. These are the new twinjets (A300, A310, Boeing 757, Boeing 767) with a range limited to around 2,600 miles or less if the journey involves overwater sections.

SEPTEMBER 1982

DC-8 comparisons in service with United and Delta

Capacities	DC-8 srs 71	DC-8 srs 61	data source
Passengers	190 (26f, 164y) 238 (all economy) 212 (18f, 194y)	190 (26f, 164y) 238 (all economy) 198 (26f, 172y)	EA EA DL
Crew	3 pilots 4-6 flight attendants 6 flight attendants	3 pilots 4-6 6	EA/DL EA DL
Cargo	2,500cu ft	2,500cu ft	EA/DL
Fuel	23,393 US gal	23,393 US gal	EA/DL
Weights			
Maximum take-off	325,000lb	325,000lb	EA/DL
Maximum landing	240,000lb	240,000lb	EA/DL
Operating empty	167,600lb 164,280lb	163,000lb 160,000lb	EA DL
Powerplant			
Manufacturer	General Electric/SNECMA	Pratt & Whitney	EA/DL
Model	CFM56-2-C1	JT3d-3B	
Take-off thrust	22,000lb	18,000lb	
Take-off bypass ratio	6.0	1.4	
Performance			
Fuel efficiency			EA/DL
Seat miles/gallon	62.5 (600 miles) 67.3 (1,000 miles)	46.3 53.3	
Initial cruise altitude — standard temperature and pressure at 250,000lb t.o.w.	39,000ft	36,000ft	
Take-off field length			
6,000 miles fully loaded — standard temperature and pressure at 30°C	4,600ft 5,500ft	5,200ft 6,200ft	EA DL (at ATL)

Source EA=Eastern Airlines DL=Delta Airlines

Compare also the aircraft capable of the new DC-8's range; the Boeing 747, McDonnell Douglas DC-10 and Lockheed TriStar all with considerably more seats to fill. So the DC-8 srs 70 is going to carve its own operational area and will be able to fly without competition, in that market. Coupled with the ability to operate into less well equipped airports by virtue of the new APUs and improved performance, the DC-8 srs 70 will be especially attractive to the long-haul supplemental carriers.

The new engines are assembled by SNECMA in France and by General Electric in the US, in equal numbers. Each completed engine is shipped to Grumman Aerospace either on Long Island or at Stewart, Fl. Grumman-built pods, cowls and pylons are attached and the whole assembly is loaded on to a truck for the journey to McDonnell Douglas in Tulsa. The construction of Grumman parts for this programme involves none of the new advanced composite materials that they are using on the new Boeings.

While the engine assemblies are being transported to Tulsa, the aircraft destined to

receive them will arrive at Tulsa International Airport and be towed to the plant on the east side of the airport. The existing engines will then be removed together with the pylons and ancillary items linked with the JT3s. Usually the aircraft's owner will receive the old parts back unless the contract specifies that Cammacorp disposes of them. SNECMA will have constructed the thrust reversers and shipped them to Tulsa direct, resulting in all parts being ready for the modification.

Access to the wing torsion box is made through the leading edge of the wing, and remarkably most of the operation can be done without disturbing the majority of the wing surface. Varying degrees of strengthening are placed on the wing web depending on the original specification for that DC-8. For a srs 61 where 'over-the-wing' pylons were used the completely new hanging structure is installed before engine mounting, whereas for the srs 62 and srs 63 where underwing pylons were used, a more simple and less time consuming installation may be made.

Wing structure and leading edge replacement parts for the programme are

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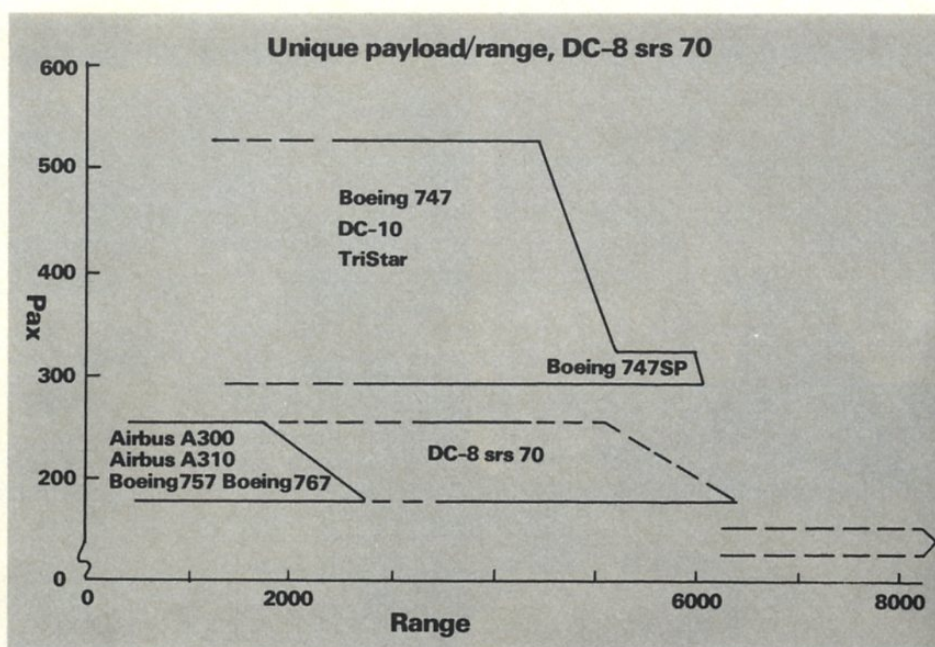
manufactured at the Tulsa plant. The new engines are approximately 1,000lb heavier and positioned differently to the JT3Ds and these are the reasons for strengthening the pylon and attachment fittings. Once the new fittings are installed the pylons will be removed from the assembled CFM56 engine, mounted on the wing and then the rest of the engine assembly is lifted to be hung from them. Very few jigs were needed and in fact most of the production tooling was for a small number of detailed tools to construct the new wing parts. Workstands and support structures were built to facilitate quick replacement of the engines and some alignment equipment was produced for the new engine specifications.

Finally the aircraft is rolled out and test flown. The first production aircraft of each model have been dispatched to Yuma, Az where Douglas Aircraft take over on the FAA Certification flight programme. The final stage of the programme involves calibration and evaluation of the aircraft's changed performance, a check that the performance guarantees are met, and a final clean up before presentation to the owner.

The CFM 56 will give the DC-8 srs 70 better performance in terms of take-off and range extension. At maximum take-off weight at standard temperature and pressure at sea level (15°C and 1013.2 mb) a DC-8 srs 61 requires 9,900ft of runway where a srs 71 will roll over only 8,850ft. Once airborne it will fly between 5,100 and 6,300 miles depending on seating capacity, in still air. This equates to a massive 24.6% improvement over original versions. Fuel burn/seat will be comparable to the new Boeing 767 and should show an improvement over the Boeing 727-200 of about 50%, a fact that will carry great weight in favouring the retention of a large fleet of DC-8s. In monetary terms this improvement will save an operator an estimated \$20million in 6½ years assuming an average sector length of 2,000 miles and a 3,500 hour annual utilisation even if fuel is purchased at \$2 a gallon (which it still has not reached in the US).

The CFM 56-2 engine, with a bypass ratio of 6:1 will be rated at 22,000lb static thrust for the DC-8, 17% more power than the JT3D-7 and 22% more than the JT3D-3B. The engine will be certified by the FAA to 24,000lb thrust. Even at 30,000ft flying altitude the engine will give between 7.5% and 12.5% better performance over the JT3s and this will enable the DC-8 srs 70s to cruise at a higher and more comfortable altitude. With a 16% better climb-out a steeper departure will further reduce the noise burden to local communities.

Currently the JT3 engines in use on the DC-8 are of two kinds, the JT3D-7 and the JT3D-3B; these being the SAM (sound absorbing material) treated and hardwall versions respectively. Assuming a gross landing weight of 240,000lb and a gross take-off weight of 325,000lb the hardwall JT3-powered DC-8 leaves a 6.4 square mile noise 'footprint' measured at 100 EPNdB. The SAM-treated engines on the same aircraft will leave 4.3 square mile footprints, but the CFM 56-powered aircraft will leave only



one square mile over the 100 EPNdB level, a fact that was evident when N8093U made its first flight as a srs 71 from Tulsa on 15 August 1981. Put in the context of Los Angeles where by 1987 5,434,000 people will live within the 80 EPNdB level, only 828,000 will be affected by a re-engined DC-8. Similarly in Chicago 6,977,000 people will have been spared the burden, or about 75% of the population of greater Chicago as estimated for 1987. The exhaust of the CFM56-2 has a pollutant level below environmental requirements due to more efficient burning of fuel, and the difference is noticeable to ground observers.

The re-engine programme has Cammacorp as prime contractor and marketing unit who obtain the engines through CFM International. Cammacorp's performance has been guaranteed by both GE and SNECMA. They subcontract the design and associated work to the original manufacturer, Douglas Aircraft Company at Long Beach, Ca and the modification work itself to the McDonnell Douglas plant in Tulsa, Ok. The final evaluation, preparation of manuals and customer support is entrusted to the Douglas Aircraft Co at Long Beach, Ca. Cammacorp assumes the role of overseer in keeping the three major steps to the programme in time, addressing scheduling and production problems as they arise. Representatives are present at each site concerned with production.

Apart from the jobs at SNECMA and GE ensured for production of the CFM 56, the programme will create useful work at the Yuma facility and approximately \$2.5 million will be spent in the Tulsa economy alone, to 1985.

Some of the customers who have so far ordered re-engining for their DC-8s are Spantax of Spain and the French AF transport wing, plus the US supplemental carriers Capitol and Transamerica, freight carrier Flying Tigers, US scheduled airlines United and Delta, and Air Canada for the srs 60 aircraft. With the exception of the United and Delta aircraft, these DC-8s will most likely

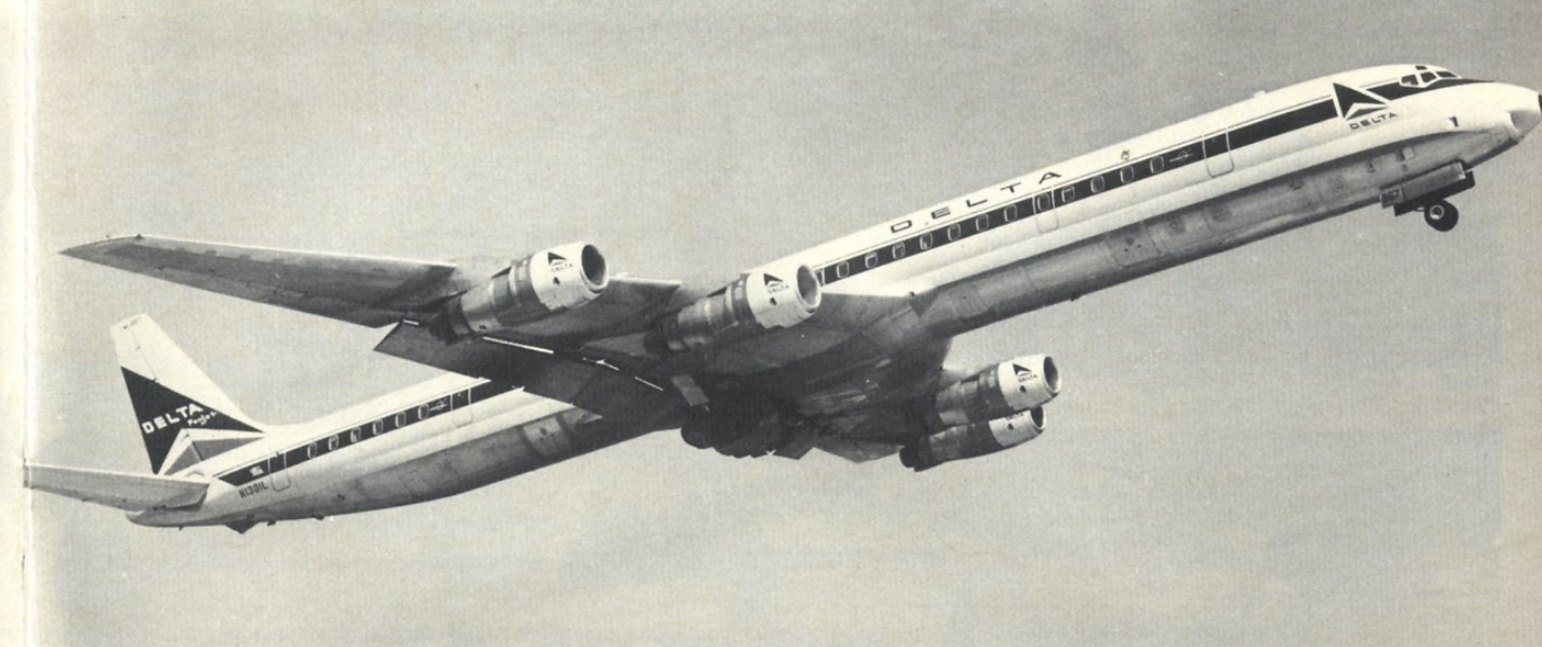
be seen at airports around Britain towards the end of this year.

Two of the major airlines who are operating the retrofitted DC-8s are United and Delta. United's first DC-8 srs 71 entered service in the spring of this year, shortly after Cammacorp received its FAA supplemental type certification with the aircraft. Within 36 months of becoming the launch customer, United is reaping the many benefits of the programme. Certification of the srs 72 and srs 73 is expected shortly, but United quotes already show the DC-8 srs 71 is cutting noise levels between 10 and 17 EPNdB and this puts the aircraft well ahead of FAR part 36 limits.

United Airlines refitted the aircraft's interior to improve passenger amenity and added colour radar in the flight deck. Only eight of United's DC-8 srs 70s will have the APU fitted because these will adequately provide cover for offline charter operations.

The second well known airline having its DC-8s refitted is Delta, but its programme differs in that only the first of 13 srs 61s (N1301L) was refitted in Tulsa by Cammacorp. Delta wished to make a complete refit and give a major overhaul, repaint and substantial wing reskinning to its DC-8 fleet. The total downtime of each aircraft during such a modification would have been too much for Delta's frequent services to stand, and so the second to thirteenth aircraft in the fleet will be modified at the Delta Technical Operations Center (TOC) in Atlanta. The French AF also elected to make its own modifications after the first in its squadron is completed. By keeping the aircraft at the home base the operator can accomplish the new work simultaneously with the overhaul using its own staff, and indeed Delta prides itself on having cut the total modification time from over three months to just over two.

Delta passed 300 mechanics, electricians and inspectors through the modifications training programme to begin work at its TOC; a further 200 have attended the 20 hour maintenance classes. With only one air-



craft down at any time, the airline expects all aircraft to be back in service by early-1984.

Each DC-8 will undergo its 20,000 hour maintenance schedule, where all the critical structures are checked and replaced as necessary. The new AiResearch air conditioning units of the air cycle type will replace the Freon coolers of the srs 61s. New lightweight seats will be used which not only save weight but also give more leg room allowing a closer seat pitch.

In the flight deck work includes modernisation of the vertical speed indicator, attitude indicator, the compass and the radio altimeter. New instruments will be a horizontal situation indicator and equipment for the Omega navigation system as fitted to company TriStars. Delta's 220 DC-8 pilots will undergo between five and eight hours of training on the new instruments which are

similar to those in the company's Boeing 727s.

At the time of writing the first DC-8 srs 71 from the TOC (N1306L) has joined the original Delta srs 71 in service, and work is well underway toward returning the third to the flight line.

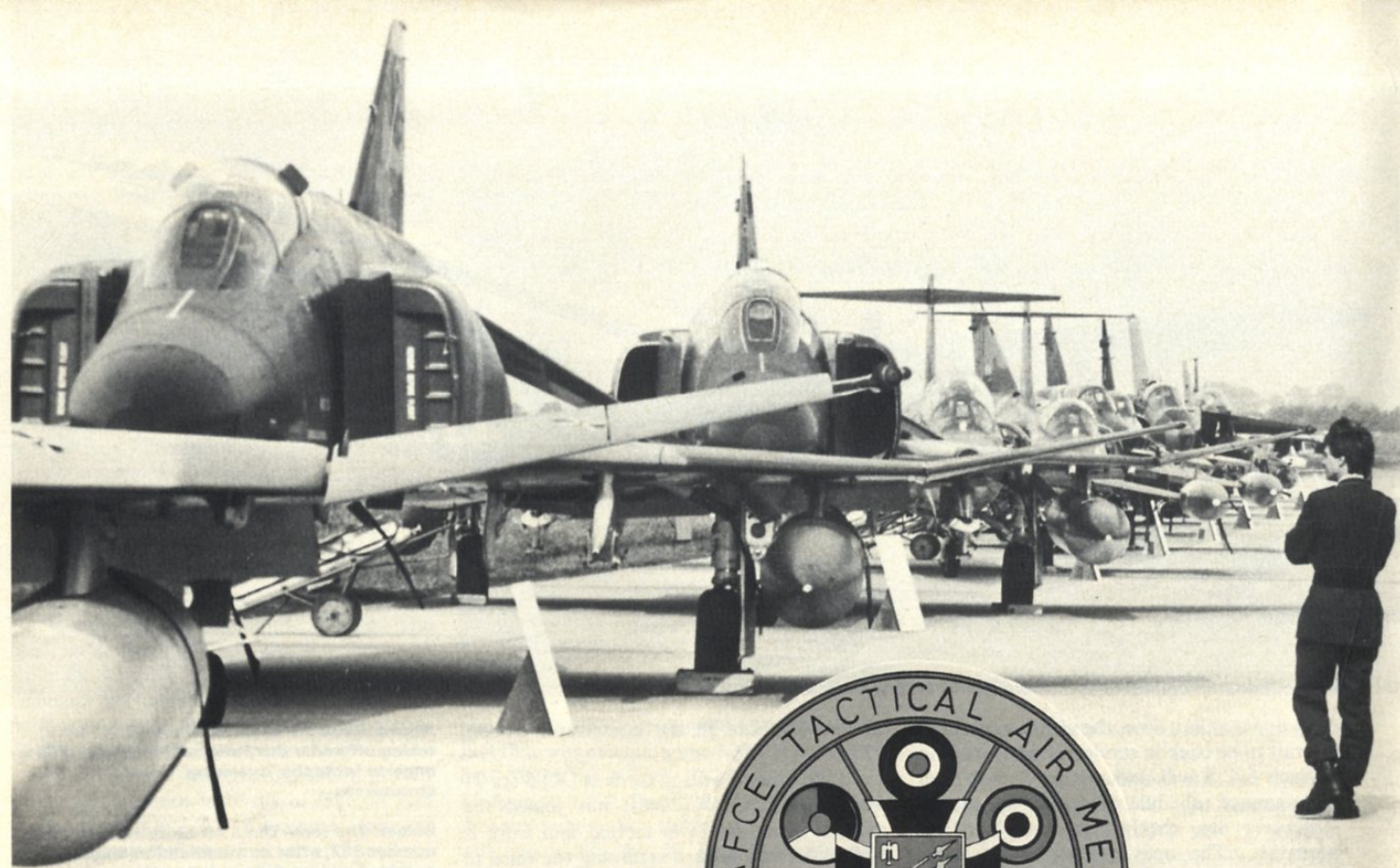
Acknowledgements

The author would particularly like to thank Mr Carl E. Weidner of Cammacorp who, as Senior Resident Representative at the McDonnell Douglas plant in Tulsa, was generous with his time and answers to help in the preparation of this article. Also gratefully acknowledged is the assistance given by both Chuck Novak of United Airlines for providing photographs and data on the United fleet, and Richard E. Jones, manager public relations for Delta Air Lines.

Above: Delta Air Lines DC-8 srs 60, N1301L, taking off under the power of its original JT3 engines (note the 'overwing' pylon structures).

Below: The same Delta Air Lines aircraft, fleet number 867, after its modification, major overhaul and repaint carried out by Cammacorp. Another 12 Delta DC-8s are to be retrofitted to the standard, although the work will be completed by the airline's own Technical Operations Center in Atlanta.
Photos: Delta Air Lines





TAM 82



Story and photographs by
**Ben Ullings/Aviation Photos
International and RAF Germany/
Public Relations**

THE 1982 Tactical Air Meet (TAM) of the NATO Central Region Air Forces Europe took place at Jever AB, North Germany over 12-23 June. Around 80 aircraft of six NATO countries — Belgium, Canada, Federal Republic of Germany, the Netherlands, UK and the US — participated in the bi-ennial event. With the aim of improving inter-operability and effectiveness of Air Forces, TAM82 was organised by Commander Allied Air Forces Central Europe (AAFCE), to exercise and evaluate combined tactical air operations in a realistic environment.

However, with TAM82 the inheritance of the Tactical Weapons Meet and 'Royal Flush' competitions, as conducted since 1968, has been definitely shelved. Two years ago, during TAM80 at Ramstein AB, several days were still reserved to enable crews of NATO's 2nd and 4th Allied Tactical Air Forces (ATAF) to compete individually or as a team for a number of trophies, but for the first time, the 1982 event was entirely programmed as an exercise.

With a few exceptions the participating

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TAM 1982 — participating units and aircraft

Nation/unit	Base	No of aircraft/type
Belgium		
No 3 Fighter Bomber Wing	Liege Bierset	4/Mirage VBA
No 42 Squadron	Florennes	5/Mirage VBR
No 1 Fighter Wing	Beauvechain	4/F-16
Canada		
No 1 Canadian Air Group	Soellingen	4/CF-104
France		
EC 1/11*	Toul	Jaguar
ER 3/33*	Strasbourg	Mirage III
Germany		
JBG 32	Lechfield	4/F-104G
JBG 33	Büchel	4/F-104G
JBG 34	Memmingen	4/F-104G
JBG 36	Hopsten	4/F-4F
AKG 51	Bremgarten	3/RF-4E
JG 71	Wittmund	2/F-4F
JG 74	Neuberg	2/F-4F
Netherlands		
No 306 Squadron	Volkel	3/RF-104G
No 322 Squadron	Leeuwarden	4/F-16
UK		
No 2 Squadron	Laarbruch	4/Jaguar
No 92 Squadron	Wildenrath	3/Phantom FGR2
US		
32nd TFS	Soesterberg	2/F-15C
36th TFW	Bitburg	2/F-15C
1/38 TRS	Alconbury/Zweibrücken	3/RF-4C
52nd TFW	Spangdahlem	4/F-4E/G
*Guest teams		

Air Forces had honoured the request by the organisers to delegate crews that had staged through the Tactical Leadership Programme (TLP) as conducted at Jever AB since July 1979. The TLP consists of a ground seminar where complicated tactics are discussed followed by a flying phase during which different concepts can be tried out in order to achieve a most effective mission-performance.

The location at Jever of TAM 82 was not incidental as the 'Meet' has been reshaped into a large format TLP. The participation by TLP-experienced crews offered the opportunity to use their skills to improve the exercise lay-out and simultaneously it enabled them to practise in a larger scenario.

Facing page, top: Aircraft from all the participating units on display at the opening of TAM82 at Jever AB on 12 June.

Facing page, centre: Jaguar GR3s of No 2 Squadron from RAF Laarbruch undergoing maintenance after a mission at TAM 82; note the graffiti-adorned hangar in the background.

Photos: RAF Germany/Public Relations

Facing page, bottom: A pair of F-15C Eagles ready to depart for a Combat Air Patrol (CAP). Four USAF F-15s took part in TAM 82, two from the 36th TFW at Bitburg (seen here) and two from the 32nd TFS at Soesterberg.

Below left: The Meet was attended by two guest teams from the French AF, one of which was EC1/11 from Toul in its Jaguars.

Below: A Luftwaffe F-104G awaiting its turn to embark on a TAM 82 sortie, while another aircraft climbs away in the distance.

Photos: Ben Ullings/Aviation Photos International



From a sporting angle, competition flying was no longer feasible as unavoidably some types of aircraft were sure winners even before the flying started; the way the A-10 outmastered its opponents during the TAM 80 strafing contest being one such example. Another deciding factor was the extra funds required to have each individual team set up a range attack, instead of engaging a single mixed Air Force/ATAF formation. The latter procedure gives a much better return in information-exchange, saves fuel and ammunition and involves a lesser number of aircraft and related maintenance expenses.

Nevertheless, TAM 82 created an influx at Wittmund and Jever of around 1,100 extra personnel and extended over a total of nearly 650 sorties. Among the attendees was a large team of experts from SHAPE (Supreme Headquarters Allied Powers Europe), the TLP Staff and the AAFCE directing staff to analyse results. A first opportunity to do so was the daily mass-briefing where wide use of video equipment assisted the visual presentation as well as kill/no kill confirmations.

The introduction of the 'C'-variant of the USAF F-15 Eagle and the experience gained by the Belgian F-16 Fighting Falcon crews since TAM 80 provided an extra punch for the Combat Air Patrols (CAP) of the defending forces based at Wittmund AB. CAP's were flown by up to eight-ship formations consisting of F-4Fs, Phantom FGR2s, F-16s and F-15s, with tasks being divided by speciality of each aircraft.

CAP's were sent out to intercept the waves of attack aircraft spreading over the exercise areas aiming for several ranges or as a mass-force against selected airfields.

In the attack forces, debuts were made by the Dutch F-16s from Leeuwarden and the French Jaguars from Toul. The presence amid both forces of identically camouflaged F-16s posed the need to make very sure whether aiming at friend or foe, in order not to be extremely embarrassed by a videotape...

The first offensive operations of TAM 80 began at 06.30hrs GMT on 14 June. Groups of 16 aircraft attacked a long convoy of armoured fighting vehicles on Bergen-Hohne ranges. The first formation of German F-4 Phantoms was intercepted 50 miles south of Jever by RAF Phantom FGR2s of No 92 Squadron and USAF F-15s operating with the Defensive Forces. The other participating RAF aircraft, Jaguars of No 2 Squadron flying in the Dual Attack and Recce roles, got through the air defence screen unscathed — accounting for at least one of the defensive forces' Phantoms. Flying at 150ft above ground level at 580kts, they attacked the targets and returned to base at 07.30hrs GMT.

A further eight days of exercises followed and many lessons were learned. The spirit of TAM 82 was perhaps best summed up by Gen Charles A. Gabriel, COMAAFCE, in his opening speech when he commented 'though realistic training we can reduce the uncertainties of the first few days of battle and overcome the enemy's quantitative advantage — exercise and fly aggressively, smartly and safely'.



Blackpool 'lights'

Blackpool airport (Squires Gate) is situated 2½ miles south of the town centre and the site of the present airport was the scene of the first flying display to be held in Britain. Scheduled passenger transport services were started by Blackpool and West Coast Air Services in 1933 when a route was opened to the Isle of Man. This island service remained a popular operation until the outbreak of WW2.

The airfield was then taken over by the Air Ministry and developed into a standard RAF station with three runways. Although No 3 School of General Reconnaissance was the principal resident, its Ansons and Bothas were not alone. Fighter squadrons involved in the defence of the northern cities were also based at Squires Gate, while occasional visits by a diverted Railways Air Services Rapide added to the variety.

After WW2, the Ministry of Civil Aviation assumed control in 1946, whereupon charter and air-taxi work was started, particularly by Lancashire Aircraft Corporation. Later this company became one of the airlines permitted to operate scheduled services from Blackpool to such places as Leeds, London, Jersey, Southport and the ever popular Isle of Man. By the mid-1960s international routes had been added, the airlines involved being British United (CI) Airways, Aer Lingus, Autair and Starways. This situation did not last however, Air UK nowadays providing Blackpool's only scheduled services radiating to Belfast, Dublin, Isle of Man, Jersey and Rotterdam via Manchester.

The airport does not have to rely purely on these movements, since the local charter and air-taxi companies together with the light aircraft based at Blackpool, contribute a considerable number. A few of the latter aircraft-types are featured in the accompanying photographs.

Photographs by **Andrew Denholm**
story by **Alan J. Wright***



Above: Piper PA38-112 Tomahawk, G-BGBY, photographed at Blackpool airport. This side-by-side two-seat trainer has been very successful since its entry into service in February 1978 and is currently utilised by a large number of flying training schools throughout the world.



Below: Another Piper type seen at Blackpool was PA22 Caribbean 160, G-ARYH. This aircraft was the tricycle-undercarriage version of the PA-20 Pacer produced in the 1950s and remains in large-scale use today.

Above: Taxiing in front of the control tower at Blackpool-Squires Gate, is Gardan GY-80 Horizon 160, G-AZRX. Designed as a private venture by Yves Gardan, this four-seat all-metal lightplane was produced under licence by Socata, a subsidiary of Sud-Aviation. A total of 260 of the type were built and the aircraft has a cruising speed of 145mph and a range of 590 miles.

* Reprinted from *British Airports* by Alan J. Wright, published by Ian Allan Ltd at £1.25.

THE SHOREHAM SCENE

R. A. Nicholls



THE SMALL MUNICIPAL AIRPORT at Shoreham, Sussex, continues to thrive and the casual visitor is likely to witness an interesting assortment of club, private, executive, and 'third-level' airline operations, all set against the magnificent backdrop of the South Downs. Add to this the varied activities of Shoreham-based companies Spoonair, Hants and Sussex Aviation, Sussex Ag Aviation, Miles Dufon, and Rollasons, and the presence of several veteran and vintage aircraft, and it will be appreciated that there is always something of interest to be seen from the small public enclosure fronting the terminal building. A frequent visitor to Shoreham is Jersey European Airways Twin Otter, G-OJEA — seen about to depart on the return leg of a Jersey-Shoreham-Jersey schedule.



sion SHOW-PIECE

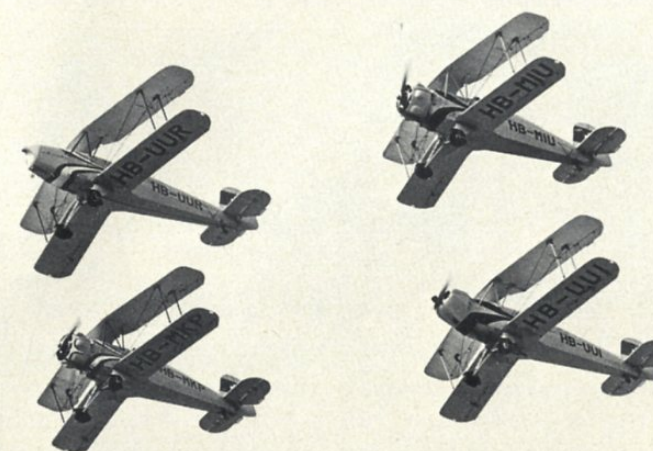
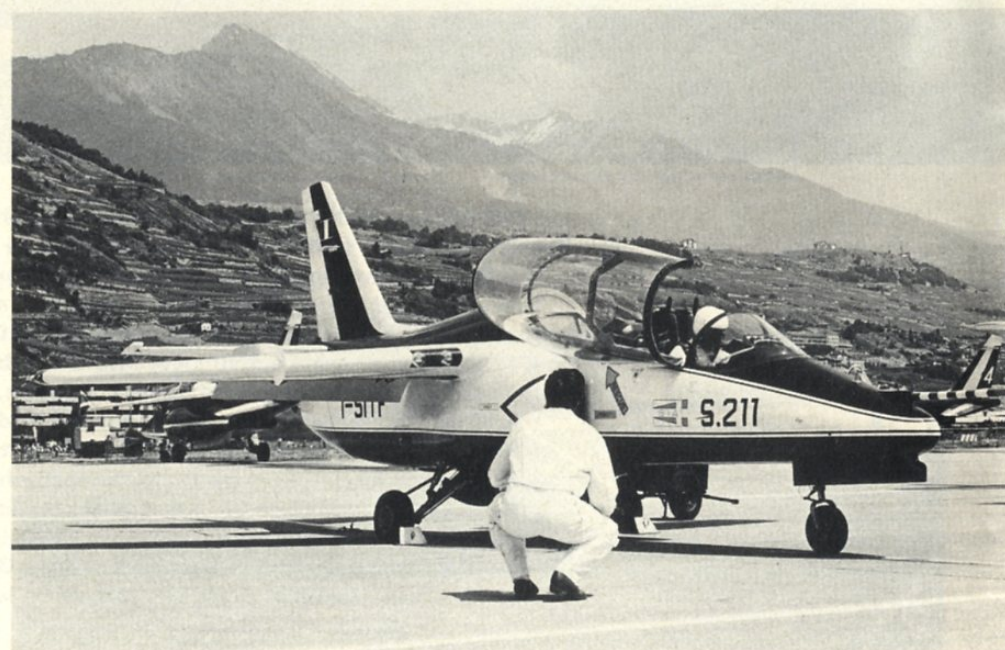
Photo report by **Mike Kirk**

SET AMID spectacular Alpine scenery, the *Aéroport de Sion* was the venue for the 1982 *Meeting Aérien International* held on 5-6 June. The event was organised by the Valais branch of the Swiss Aero Club and represented the culmination of three years of effort by its members. The main aim of the show was to provide a spectacle for the public, but at the same time it served to illustrate the role of the aircraft as an element of the economy in Switzerland and as a part of the defence of Western Europe. The event attracted a wide variety of participants and in addition to the resident and visiting Swiss AF and civil aircraft, it was attended by many interesting foreign types: ranging from Michel Colomban's Cri-Cri (the world's smallest twin-engined aircraft) to the DC-9 and P-51D Mustang to F-15 and F-16s.

From a very full weekend certain demonstrations come readily to mind. Who is likely to forget Major Böhm's display in the Mirage IIIR? On the first day of the show he made a very low and fast flypast, too fast in fact, as the Mirage slipped through Mach 1 and produced a sonic bang that must have frightened all the dogs, children and greenhouse owners between Martigny and Brigue! The sight of a cow suspended from a helicopter, placidly peering down at the crowd and twitching its tail, raised a few

laughs. However, this was a serious demonstration of how a valuable animal, perhaps trapped on the high pastures by the early arrival of winter, could be brought down to the valley in a matter of minutes. Also memorable was the way in which the B-17 was repaired after the jet-efflux from a taxiing DC-9 damaged an aileron. The

pilots of the Bücker team, personnel of Farner Air Service and the B-17 team worked through the heat of Sunday afternoon to rectify the damage and the aircraft was able to fly at the end of the display. Those who worked to make it possible must have been very content as the B-17 put on a magnificent show.



Left: The Hunter FMk 58s of the *Patrouille Suisse* make a low pass in immaculate formation at the Sion air show. Apart from the insignia on the nose and smoke generating equipment, the team uses standard Swiss AF Hunters.

Below left: Resembling a cross between the BAe Hawk and Alpha Jet, the SIAI Marchetti S211 was one of several jet trainers that attended the *Meeting Aérien International*. The aircraft's low noise levels produced many favourable comments.

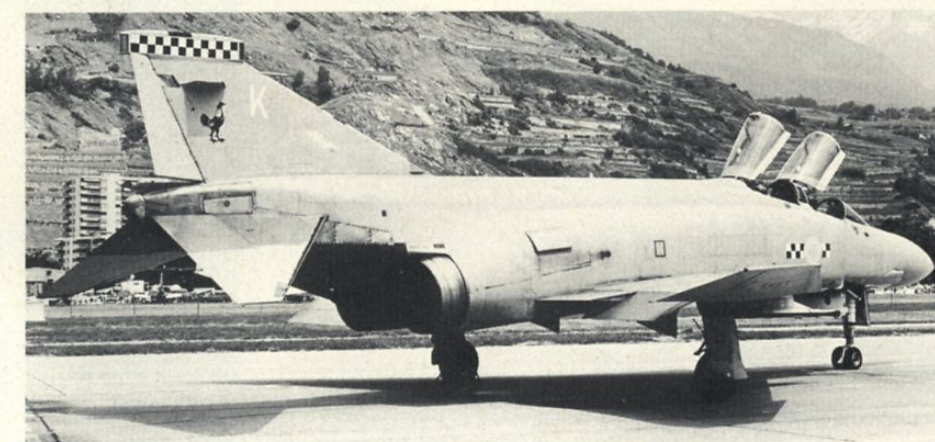
Above: Bücker Jungmanns and Jungmeisters of the 'Oldtimer Flyers' were one of the vintage attractions at the Sion event.

Top right: As part of the display to demonstrate the many uses of the helicopter in Switzerland, an Aerospatiale SA315B Lama showed how it is possible to evacuate an animal from the mountain pastures. Some onlookers wondered whether the cow was fed a low residue astronaut-style diet before take-off!

Above right: The distinctive Alpha Jets of the *Patrouille de France* parked on the apron in a numerical order line-up.

Right: Bitburg-based USAF F-15 Eagle of the 36th TFW landing at Sion for the 1982 air display.

Below right: An RAF visitor to Sion for the airshow was all-grey Phantom FG1, XT875/K, of No 43 Squadron.





The Swiss Meeting Aérien at Sion



Photography by
Peter Gunti

Above: Swiss AF Mirage IIIR, R-2114, of *Flieger Staffel 10* makes a fast flypast at Sion; this aircraft accidentally broke the sound barrier during its demonstration.

Above right: The de Havilland Venom FB54 fighter-bomber still remains in service with the Swiss AF, but is now being progressively replaced by F-5Es. This Venom, J-1149, is flown by *Fliegerschule II* operating out of Sion.

Right: One of the most impressive flying displays at Sion 1982 was given by the prototype two-seat Dassault-Breguet Mirage 2000B-01, the sleek lines of which are well shown.



SBAC's Farnborough International '82 will mark the 50th anniversary of the first SBAC Air Show and also represents the 25th Aerospace Exhibition and Flying Display presented by the Society of British Aerospace Companies at the Hampshire site.

Recognised as the world's premier aviation/aerospace product and services exhibition of the year, Farnborough International '82 promises an outstanding programme with at least three major new airliner types making their debuts — the BAe146 feederliner, the Boeing 757 and 767. Rockwell intends to have the B-1 supersonic four-engined bomber on display and, for the very first time at Farnborough, an airship will be present in the shape of the Airship Industries Skyship 500. Prospective buyers will be able to view numerous other aircraft on display in the flying programme or static park — ranging from single-seat light aircraft to wide-body airliners and light military trainers to high performance jet fighters — with the aviation manufacturers all bidding for orders in this lucrative but competitive market.

In the exhibition halls a vast range of aerospace industry products will be on show and to meet increasing demands by exhibitors for more space, the SBAC has constructed a New North Hall, adjacent to the North and South Halls.

Farnborough International '82 will be previewed by the press on 5 September and the following four days, 6-9 September, will be for the Trade. The show will host some 50,000 invited guests including heads of state and government, defence chiefs, senior airline executives and aviation and air transport policy makers from well over 100 countries. They will view the latest advances in aircraft and aero-engine design, missiles, electronics and associated equipment exhibited by over 400 major companies.

FARNBOROUGH INTERNATIONAL 82

PREVIEW

For the final three days of the Show, the gates of Farnborough will be open to the public when an estimated 200,000 will attend the event. The public premiere is Friday 10 September, with the two main open days on 11-12. On these three occasions, the 2½ hour flying programme of the Trade Days will be extended, as in previous years, to a full three hours to include various other

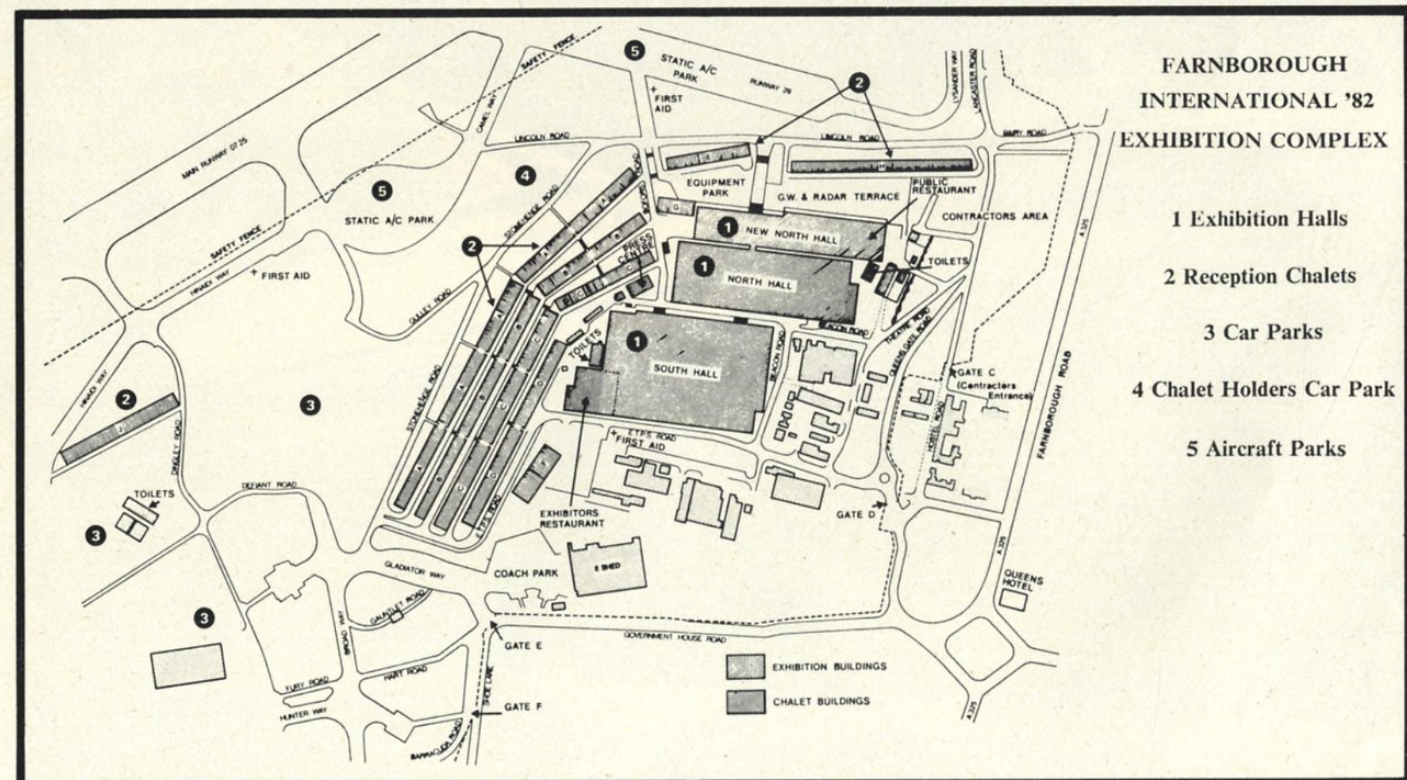
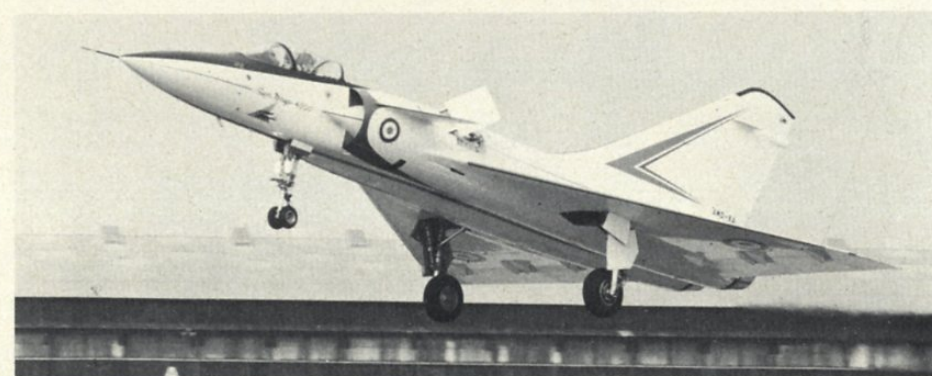
participants such as the 'Red Arrows', the Battle of Britain Memorial Flight and the Royal Navy's Historic Flight.

Show programme: The exhibition is open on the Trade Days from 10.00hrs to 18.00hrs, and on the Public Days from 09.30hrs to 19.00hrs. The flying display on Trade Days begins at 14.30hrs and on Public Days at 14.00hrs, finishing at approximately 17.00hrs.

Show site: The SBAC Exhibition and Flying Display is presented on the airfield of the Royal Aircraft Establishment at Farnborough, Hampshire some 35 miles west of London on the A325. It is served by a number of major roads, including the M3 and the A30. Special arrangements will be introduced for traffic control on the Public Days to ease traffic flow to the maximum, and visitors are asked to use recommended routes and follow the police-approved RAC signposting.

Making its debut at the last Farnborough International held in 1980, was the single-seat Super Mirage 4000 prototype, seen landing at the end of its display. Equipped with two SNECMA M53 afterburning turbofans, the delta-wing aircraft gave an impressive performance of power and agility.

Photo: Denis J. Calvert/Inter-Air Press



airregister

Compiled by A. J. Wright

THE latest vintage registration to be issued is G-AFEL, now carried by the Monocoupe recently imported from America. Not so fortunate is Tiger Moth G-ANPE which on completion of its current restoration at Southend Museum, will carry a personalised mark.

The T-33 is one of the late Haydon-Baillie fleet which, when originally registered in 1974, was one of those which helped to open the flood gates for out-of-sequence marks.

The leased Boeing 737 from Transavia, PH-TVD, has now taken up its temporary identity of G-BKBT for its stay with Britannia. Casair's new Short SD3-30, after a short time in service as G-BJUK is now known as G-OCAS.

Registration	Type	C/n	Owner or operator
G-AFEL	Monocoupe 90A	A782	C. C. & J. Lovell (N19432/NC19432)
G-BISR	Boeing Vertol 234LR Chinook	MJ-003	British Airways Helicopters Ltd (N236BV)
G-BJCN	Cessna 337H	01869	Afro-Asia Investment Co Ltd
G-BKBN	SOCATA TB-10 Tobago	287	Air Touring Services Ltd
G-BKBT	Boeing 737-2K2C	20943	Britannia Airways Ltd (PH-TVD)
G-BKBV	SOCATA TB-10 Tobago	288	Martin Ltd
G-BKBW	SOCATA TB-10 Tobago	289	Air Touring Services Ltd
G-BKCB	PA-28R Cherokee Arrow 200	7435186	MLP Aviation Ltd (OY-POO/CS-APD/N41460)
G-BKCF	Rutan LongEze	ICF-01	I. C. Fallows
G-BKCG	Boeing 727-117	20328	Dan-Air Services Ltd (HC-BIC/XA-GUU/N116TA/CF-CPK)
G-BKCV	Jodel D120	285	T. Rayner & P. McIntosh (F-BMYF)
G-BKDA	AB-206B JetRanger	8337	Autair Ltd (LN-OQX)
G-BKDB	A-Bell 205A-1	4512	Autair Ltd (LN-ORU)
G-BKDK	Thunder A7-77Z balloon	428	Thunder Balloons Ltd
G-BKDR	Pitts S1S Special	10654	T. R. G. Barnby
G-BKDS	Colt 14A balloon	340	Colt Balloons Ltd
G-BKDT	SE5A replica	278	J. H. Tetley & W. A. Sneesby
G-BKDU	PA-23 Aztec 250	27-3976	Samtanus (UK) Ltd (ZS-FNB/N6600Y)
G-BKDV	Beech B80 Queen Air	LD-310	Samtanus (UK) Ltd (ZS-NAC/ZS-LMR/N7011H)
G-BKDW	K-1260/3 Stu balloon	0306	P. C. Carlton
G-BKDZ	Cessna F152	1439	Campbell Airviews Ltd (PH-VSM/PH-AXE)
G-BKEA	BN-2B Islander	2146	Pilatus BN Ltd
G-BKEB	BN-2B Islander	2147	Pilatus BN Ltd
G-BKEC	BN-2B Islander	2148	Pilatus BN Ltd
G-BKED	BN-2B Islander	2149	Pilatus BN Ltd
G-BKEE	BN-2B Islander	2150	Pilatus BN Ltd
G-BKEF	BN-2B Islander	2151	Pilatus BN Ltd
G-BKEG	BN-2B Islander	2152	Pilatus BN Ltd
G-BKEH	BN-2B Islander	2153	Pilatus BN Ltd
G-BKEI	BN-2B Islander	2154	Pilatus BN Ltd
G-BKEJ	BN-2B Islander	2155	Pilatus BN Ltd
G-BKEK	PA-32 Cherokee Six 300	7540091	Cruspane Ltd (OY-TOP)
G-BKEO	Cameron House SS 60 balloon	600	Cameron Balloons Ltd
G-BKER	SE5A replica	10641	N. K. Geddes
G-BKES	Cameron Bottle balloon	846	Lighter-Than-Air Ltd
G-BKET	PA-19 Super Cub 95	18-1990	G. R. Lennon (MM52-2390/52-2390)
G-BKEU	Taylor JT-1 Monoplane	10553	R. J. Whybrow & J. M. Springham
G-BKEX	Rich Prototype Glider	1	D. B. Rich
G-BKEY	FRED srs 3	10208	G. S. Taylor
G-BKEZ	PA-19 Super Cub 95	18-1628	A. N. G. Gardiner (OO-SPL/51-15628)
G-BKFA	Monnet Sonerai IIL	10524	R. F. Bridge
G-BKFB	AS350B Ecureuil	1613	T. W. Walker Ltd
G-BKFD	Westland 30 srs 100	004	Westland Helicopters Ltd
G-BKFE	Westland 30 srs 100	005	Westland Helicopters Ltd
G-BKFF	Westland 30 srs 100	006	Westland Helicopters Ltd
G-BKFG	Thunder A73	431	Thunder Balloons Ltd
G-BKFH	Cessna T303	00122	Rogers Aviation Ltd
G-BKFI	Evans VP-1	10491	F. A. R. de Laverne
G-BKFK	Isaacs Fury II	GCJ-01	G. C. Jones
G-BKFM	Quickie Q2	RDPC-01	R. I. Davidson & P. J. Cheyney
G-BKFR	CP301C Emeraude	519	I. N. Jennison (F-BUUR/F-BJFF)



Registration	Type	C/n	Owner or operator
G-BKGB	Jodel D120	267	R. W. Greenwood (F-BMOB)
G-BTCG	PA-23 Aztec 250	27-3646	The Cronite Group PLC (G-AVRX/N6438Y)
G-BUDY	Colt 17A balloon	413	Colt Balloons Ltd
G-BWHO	Thunder A7-56Z balloon	417	Thunder Balloons Ltd (G-BJZP)
G-CRTI	PA-28RT-201 Arrow IV	7918238	Aircraft Mart (Staverton) Ltd (SE-ICY)
G-DFIN	SA365N Dauphin 2	6028	McAlpine Helicopters Ltd
G-ECHO	Enstrom F-280C-UK-2	1017	Southern Air (G-LONS/G-BDIB)
G-FLCO	Sequoia F8L Falco	719	J. B. Mowforth
G-FOAM	MS892 Rallye Commodore	10737	Precision Foam (G-AVPL)
G-FYEI	Portwood XVI balloon	ASK-274	A. P. Russell
G-FYEJ	Rango NA-24 gas balloon	NHP-30	N. H. Ponsford
G-FYEL	European E842 balloon	S-25	D. Eaves
G-IESH	DH82A Tiger Moth	83738	I. E. S. Huddleston (G-ANPE/F-BHAT/G-ANPE/T7397)
G-IVOR	Aeronca 11AC Chief	1035	I. E. Dadswell (EI-BKB/N9397E)
G-JETT	Canadair T-33 Mk 3	261	Anvil Aviation (Aircraft Restoration) Ltd (G-OAHB/CF-IHB/CAF133261/RCAF21261)
G-JORR	AS350B Ecureuil	1530	Colt Car Co Ltd (G-BJMY)
G-JULI	PA-28R Cherokee Arrow 200	7435248	S. Winford (OY-POV/N43128)
G-LOBI	Thunder A7-77Z balloon	425	Thunder Balloons Ltd
G-MBNI	Typhoon Triptacer	BS-01	B. Smith
G-MBNJ	Eipper Quicksilver MX	12145	C. Lamb & ptnrs
G-MBNK	Eagle Microlight	B2398/MJ	R. Moss
G-MBNT	Eagle Microlight	MDO/01	M. D. O'Brien
G-MBNU	Hilander & Hiway Skytrike	DWIV-01	D. Wilson
G-MBNV	Skytrike Microlight	816	D. L. Buckley
G-MBNW	Flexwing Microlight	JTM-01	J. T. Meagher
G-MBNX	Solar Storm	FK-01	F. Kratyk
G-MBNI	Steer Terror Fledge II	MJS-01	M. J. Steer
G-MBNZ	Hiway Skytrike Demon	EBJP-01	E. Battersea
G-MBOB	American Aerolights Eagle	NJO-01	N. J. Oldacres
G-MBOC	Ultraspots Triptacer 250CC	532-A	R. Lewis-Evans
G-MBOD	American Aerolights Eagle	3082	M. A. Ford & ptnrs
G-MBOG	Flexiform Sealander	DER-01	D. E. Richards
G-MBOK	Dunstable Microlight	153/042/6	W. G. Brooks
G-MBOP	Hiway Demon	ER17D	R. Holden
G-MBOR	Chotia 460B Weedhopper	DJW-01	D. J. Whysall
G-MBOT	Hiway 250 Skytrike	2JM	J. R. G. Swales
G-MBOU	Scout Microlight	432R3	T. Spieres
G-MBOV	Lightning Trike	L170/170	S. R. Barringer
G-MBOW	Solar Wings Typhoon	JM-01	J. Mills
G-MBOX	American Aerolights Eagle	JSP-01	J. S. Paine
G-MBOZ	Eipper Quicksilver MX	10992	W. N. Dobson
G-MBPA	Weedhopper srs 2	CHS-2	C. H. & P. B. Smith
G-MBPB	Pterodactyl P-traveller	PEB-01	P. E. Bailey
G-MBPC	American Aerolights Eagle	RSM-01	R. S. Martin
G-MBPD	American Aerolights Eagle	RGH-01	R. G. Harris & K. Ball
G-MBPE	Ultraspots Trike	LAH-01	L. A. Humphreys
G-MBPF	Southern Aerospots Scorpion	D0006	R. L. Wadley
G-MBPG	Hunt Skytrike	JAH-1	J. A. Hunt
G-MBPI	MEA Mistral Trainer	500	M. J. Kenniston
G-MBPJ	Moto Delta	001	J. B. Jackson
G-MBPL	Hiway Demon	RMS-01	R. M. Strange
G-MBPM	Eurowing Goldwing	EW-21	A. B. Paton & ptnrs
G-MBPN	American Aerolights Eagle	3895	N. D. & P. C. Woller
G-MBPO	Volnik Arrow	001	N. A. Seymour
G-MBPP	American Aerolights Eagle	E2364	D. C. North
G-MBPR	American Aerolights Eagle	3112	P. Kift
G-MBPS	Gryphon Willpower	1/1004	A. B. Willgress
G-MBPT	Demon 250 Trike	KMS-01	K. M. Simpson
G-MBPU	Demon 250 Trike	DSS-01	D. S. Simpson
G-MBPX	Eurowing Goldwing	EW-42	W. R. Haworth & V. C. Cannon
G-MBPY	Ultraspots Triptacer	RKP-01	R. K. Parry
G-MBRA	Catto CP16	JB-01	J. Brown
G-MBRC	Skycraft Scout Mk II	0438R/S	Skycraft (UK) Ltd
G-MBRD	American Aerolights Eagle	E2635	D. R. Gibbons
G-MBRE	Skycraft Scout	73962	R. G. Buck
G-MBRF	Weedhopper 460L	460/1361	L. Rippon-Smith
G-MBRH	Ultralight Mirage Mk II	RALH-01	R. A. L. Hubbard
G-MBRK	Huntair Pathfinder	RMK-01	British Air Ferries Ltd
G-MBRN	Hiway Demon 175	WZ-17D	R. A. Nicholls
G-MBRO	Hiway Skytrike 160	SM160-15046	R. J. Hughes
G-MBRP	American Aerolights Eagle	E2583	F. G. Rainbow
G-MBRS	American Aerolights Eagle	RWC-01	R. W. Chatterton
G-MBRT	Airwave Comet Trike	UPCMT165	R. E. Patterson
G-MBRU	Skyhook Microlight	BASO-01	B. Anderson & S. Ogston
G-MBRV	Eurowing Goldwing	EW-41	J. H. G. Lywood & A. A. Boyle
G-MBRZ	Hiway Vulcan 250CC	ACS-01	A. C. Snowling
G-MCAH	AS355 Twin Squirrel	5120	McAlpine Helicopters Ltd
G-MKOA	BAe 125 srs 403B	25227	British Aerospace Hatfield (G-AYFM)
G-OCAS	Short SD3-30	3082	Casair Aviation Services Ltd (G-BJUK)
G-PARK	Lake LA-4-200 Buccaneer	543	Leisure Sport Ltd (G-BBGK/N39779)
G-RJMI	AA-5A Cheetah	0895	R. J. Mole (N27170)
G-SFHR	PA-23 Aztec 250	8054041	E. L. Becker & J. Harper (G-BHSO/N25272)
G-TESS	Quickie Q2	479	D. Evans
G-TIGT	AS332L Super Puma	2040	Bristow Helicopters Ltd
G-TOYS	Enstrom F-280C-UK-2	1218	AB Gee of Ripley (G-BISE)

Left: A new registration to appear in this month's column is G-PARK carried by Leisure Sport's Lake Buccaneer. Formerly G-BBGK/N39779, the aircraft is operated from Thorpe Park (hence its registration) but was a visitor to Leeds/Bradford airport on 3 July. Photo: Colin Addison



ALCONBURY'S AGGRESSORS

'TIGERS Eat Meat, Not Metal' proclaimed a kerb-side notice at RAF Alconbury as we drove up to the low, buff-bricked operations building, dwarfed by the surrounding steel and concrete-slabbed 'Tab Vee' hardened shelters, that each provide the lair for a pair of Northrop F-5E Tiger fighters.

Once inside the 'ops' centre, the author was warmly welcomed by Capt Steve 'Bear' Emery, from Missouri, one of the select band of 25 pilots fortunate enough to fly these F-5s. They enjoy one of the most exhilarating and highly specialised jobs in the fighter business, and for good measure have the added perk of extensive travel throughout Europe! They are the 'Aggressors', the sharp end of the 527th Tactical Fighter Training Aggressor Squadron.

The Aggressor concept had its origin in the Vietnam war where despite their superior training and equipment US fighter pilots sustained excessive losses in their encounters with Communist North Vietnam MiG-17s and MiG-21s which were smaller and more agile than most American fighters. Before the end of that conflict, the US Navy initiated its 'Top Gun' combat training scheme whereby T-38s and A-4s assumed the role of Communist fighters — with an encouraging improvement in USN kill rates. In 1972 the USAF followed suit with 'Project Red Baron' in which all available

Roger Lindsay visits RAF Alconbury to take a look at the 'Aggressor' operations of the USAF's 527th TFTAS

Above: Aggressor pilot Capt Steve 'Bear' Emery goes through his pre-flight procedures and gets a 'thumbs up' on a landing light check, while another member of the groundcrew removes the external power supply from the F-5E.

All photos in this article by the author unless otherwise credited

Left: Silver-finished F-5E, 74-01547, of the 527th TFTAS being prepared for a DACT (Dissimilar Air Combat Training) mission at RAF Alconbury. The Aggressors' aircraft carry Soviet-style numbers on their noses and a red star on the front undercarriage door.

data on Vietnam air-to-air combats was analysed. Three main factors emerged: because of their smaller fighters the Communists had often been able to attack without first being observed; secondly, there was a general lack of threat knowledge on the part of the US pilots; thirdly, there were serious American training deficiencies.

The 'Red Baron' report, recommending the establishment of a special unit to simulate Soviet fighter tactics in order to upgrade USAF standards was adopted, and the 64th Fighter Weapons Squadron was formed on 15 October 1972 at Nellis AFB,

Nv. It was equipped with the USAF's standard supersonic trainer, the two-seat Northrop T-38 Talon, which closely approximated to the MiG-21 in size and manoeuvrability. The T-38s were painted in a variety of colour schemes similar to those used by the Warsaw Pact, and by several Middle East recipients of Soviet fighter hardware. In 1975 the more powerful and potent F-5E, possessing a comparable performance to the MiG-21 began to supplant the T-38, and the number of Aggressor squadrons was soon expanded to four by the addition of the 65th FWS at Nellis, the 26th TFTAS at Clark AFB, Philippines, serving the US Pacific Air Forces, and the 527th TFTAS which formed in April 1976 at RAF Alconbury, sharing the airfield with the RF-4C-equipped 1st Tactical Reconnaissance Squadron as part of the 10th TRW.

The 527th's highly distinctive badge depicting the scarlet Soviet five-pointed star, with superimposed rangefinder sight on a brown bear is omnipresent throughout the squadron building, from flying suit shoulder patches to coffee mugs, while at least two office walls sport the Soviet hammer and sickle flag — a sober, constant reminder of the threat which is the very *raison d'être* of the 527th. As Steve ushered me to the main briefing room it was almost a relief to

glimpse the pictures of F-15s, F-4s, Sea Harriers and other Allied fighters which decorated the corridors, autographed mementoes from the many squadrons which have visited Alconbury for Dissimilar Air Combat Training (DACT) with the 527th.

Usually the visiting detachment brings about four aircraft for the week-long course, which begins with the 'academics': ground school briefings on the history, objectives, and fundamental principles of DACT, plus such topics as the Soviet pilot, his aircraft and its weapons, and combat formations; the squadron has its own, highly regarded, Intelligence Officer who is responsible for the acquisition of as much data on the opposition as possible, which is obtained from many sources and secured in 'the vault'. Like the course students, I was shown films of dissimilar combat training sorties taken at Nellis, and the perpetually whirling, twisting, turning gyrations of F-5s trying to 'nail' F-4s and F-15s made dramatic viewing, even without the 'G'. Instead of the hot sunshine and shimmering desert of Nevada, pilots who come to Alconbury fly their DACT sorties over the usually grey and icy North Sea, where the 527th can use three training areas: a subsonic rectangular zone 40 by 30 miles off the Wash, from FL050-245, the trapezium-shaped Bentwaters zone, also subsonic, off the Suffolk coast, and the Air Combat Training Area (ACTA), for which the Aggressors are the accredited main users. The ACTA is a cylinder of sky, cleared for supersonic flying, 30 miles in diameter, extending from 5,000ft up to 50,000ft. It is about 50 miles off the Norfolk coast and 125 miles from Alconbury, which takes 15min transit time each way — not ideal, but then the nature of the combat is intense but brief, actual engagements seldom lasting longer than two minutes, with two or three engagements/sortie, which is usually of 45-50min duration.

The flying training begins with two basic phase one-versus-one sorties, the first being a check-out trip, the second includes offensive and defensive manoeuvring. The intermediate phase involves two fighters versus one Aggressor, and leads to the final, advanced, phase of the course, when the fights become more complex, embracing combat air patrol CAP and variable sequences, which can progress from three-ship engagements (one v one v one), through larger formations such as four fighters versus four Aggressors, to three sided combats with as many as eight aircraft in total.

The 527th has its own ground-controlled interception (GCI) radar operators, nine of whom are on the squadron's payroll, including one female, and at least two of them are on permanent rotation at RAF Neatishead radar station set amidst the Norfolk Broads, from where they control all the Aggressor intercepts within the ACTA. 'We're the pilot's extra wingman' is how Maj Bill Coffman defined the controller's job, and an obvious rapport exists between the 527th's GCI controllers and their pilots, who until recently were identified during combats by their christian names or nicknames; pilots and controllers must now use numerical call



signs. The controllers have all been through a special three-month course at Nellis which aims to teach them the art of situational awareness while controlling aircraft in a fast-moving dogfight. The GCI experts assume control of an Aggressor mission as soon as the participants break the coastline on the outbound transit to the ACTA, and then position the combatants prior to the start of the intercept, controlling it from as far out as 30 miles to as close as half a mile. Steve Ritter, the longest-serving 527th controller with nearly five years in the job (about twice the length of a normal tour) succinctly summed it up: 'We're radar gypsies! Mainly volunteers. I stumbled into the job, and was extremely lucky. There's tremendous job satisfaction, especially when you're controlling several guys during a single engagement. I can't imagine a controller being happier doing anything else'. There is maximum co-operation too, between the USAF and RAF controllers at Neatishead and the latter sometimes control their own fighters during an Aggressor mission — but only if they have been checked out by the 527th and are *au fait* with the special procedures, and USAF terminology.

Aggressor GCI controllers must be familiar with the performance characteristics



of all types of participating aircraft, be aware of fuel states, and safety limits — clear visibility is mandatory in the ACTA, which is now an official danger zone. It is a tribute to everyone involved that there has never been an air-to-air accident in the UK training areas since the advent of Aggressor DACT missions.

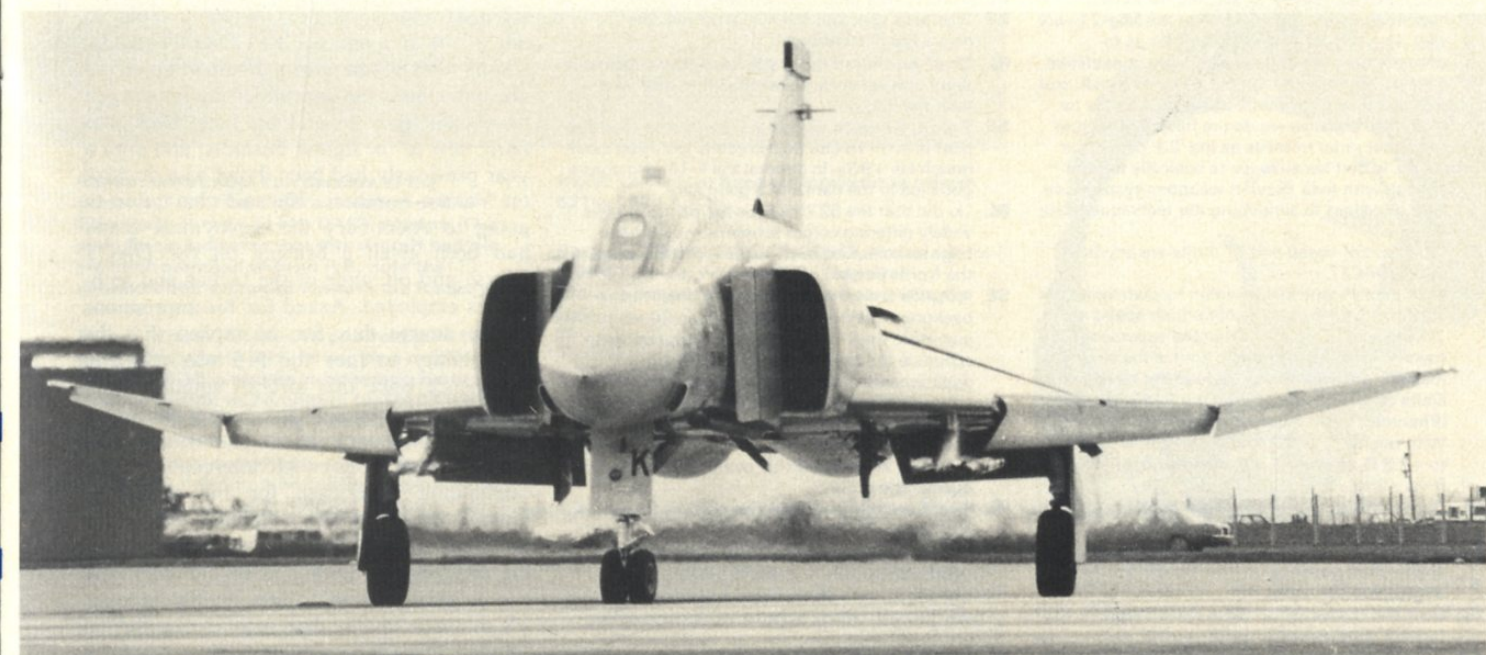
In addition to holding DACT courses at Alconbury, the 527th sends detachments, usually lasting two weeks, to the home bases of USAFE and Allied fighter units throughout Europe for the same purpose. In Aggressor parlance these are termed 'packages' and generally involve three F-5s, three or four pilots, a couple of controllers, and back-up ground support, air transported by C-130. For the past two years a six-ship

F-5 detachment has been resident at Decimomannu, the NATO tactical fighter weapons range on the southern tip of Sardinia, where the weather is kinder and the combat range is equipped with Air Combat Manoeuvring Instrumentation (ACMI) which greatly improves post-sortie assessment.

Aggressor pilots are all volunteers, and there's no shortage of applicants. Whenever there's a vacancy the 527th Squadron Commander (Lt Col Robert Mendell) sends out a request through USAFE. Candidates come before a selection board, one of whose members is the Operations Officer, Lt Col Van Sanders, who often knows the individuals personally, for despite its size the USAF tactical fighter community seems to

readers and provide a window on the Aggressor pilot's view of his work:

- RL** How do you fly out from here, in say, a two v one?
- SE** We fly out together if it's a primary sortie, but if it's an advanced sortie, say an F-5 versus two F-15s, they'll take off first and we'll take off five minutes after. They'll go to one side of the area, we'll go to the other side, and then the fight starts, basically when everyone's inside that 30 mile circle.
- RL** What's the usual configuration of the F-5E during DACT?
- SE** Normal combat configuration for the F-5 is a clean airplane apart from a captive AIM-9J missile on one wing-tip — it doesn't matter which tip, there's no effect on handling. Down at the 'Deci' range you're going to be carrying the ACMI pod on the other wing. The pod relates to the instrumentation on the ground and its got altimeters, gyros, and things like that inside it.



Top left: A full-size plastic F-5E replica 'guards' the entrance to RAF Alconbury, home of USAFE's Aggressors and 10th TRW.

Centre left: The fin-tip aerial on this 'Lizard'-camouflaged F-5E Tiger, 74-01563, is an ILS antenna, just fitted after '63' had undergone major inspection and modification. All 527th F-5Es are scheduled for this 'mod' within 12 months.

Left: Capt Emery alongside '63' prior to departing for a mission; note his helmet resting on the cockpit sill, which carries a red Soviet star on a gold and white background.

Above: No 56 Squadron Phantom FGR2, XV487, rolls out on to Alconbury's runway to line up with F-5E, 74-01574 (above right), at the start of a one versus one DACT sortie. The nose-wheel leg of the Tiger is extended by 13in for take-off to increase the angle of attack and reduce take-off run.



be a surprisingly close one. The successful applicant, who must have at least 500hrs on fighters, is then posted to the Aggressor Weapons School (64/65 FWS) at Nellis on a four-month course which will entail 121hrs of academic training (three-four hours/day) and one-two sorties/day each lasting around 40min. At the conclusion of the course each student has to achieve 'certification' by giving a one-hour lecture on a pre-determined subject and exhibit exceptional leadership qualities. Although the acquisition of a few dual-controlled F-5Fs is now mooted at Nellis, the course has evolved around the single seat F-5E, and this raised one of many questions which I asked Capt Steve Emery; I think his answers will interest

- RL** Can you carry the centreline tank for combat sorties?
- SE** No — we can't fight with the centreline, it's only used for cross country flights or ferrying, for example when we go to 'Deci'.
- RL** And can you get to 'Deci' in one go from here?
- SE** In theory you can, if there's no strong headwind, and you fly straight across France, but what we do in practice is to stop off in Germany or Spain, and it takes us two flights.
- RL** Are the students who come here for a week's DACT specially selected?
- SE** Priority tends to be given to the people who haven't done it before. There's usually a spectrum — some young kids and some squadron leaders, the more mature guys!
- RL** How much emphasis is given to disengagement?
- SE** You won't see Aggressors trying to avoid a fight except if we're low on fuel. We're out there to provide the opportunity to engage us.

RL How do you simulate the launch of a missile?

SE If we're on the same frequency we call 'Atoll' for a heat, and 'Apex' to simulate a radar missile. However, on the more complex sorties we try to stay on different frequencies otherwise things can get joggled up, and that's not very realistic.

RL You try to operate within the range of the specific missile you're simulating?

SE Yes, and sometimes this is planned beforehand. What we'll do quite often is at the pre-flight briefing we'll say 'If you see a brown F-5, he's a *Flogger*, if you see a silver F-5, he's a *Fishbed*, that's about as good as we can do.

RL How do you estimate range in a dog fight situation — radar ranging?

SE A lot of the time we do it visually and a lot of that just comes with experience; by looking at the airplane you can usually tell the range, within a quarter of a mile.

RL Originally the F-5E was used to simulate the Mig-21. Has the F-5 been upgraded in any way to simulate the Mig-23 *Flogger*?

SE The F-5E was originally selected because it happened to be able to simulate the Mig-21 very well. The Mig-23 is very difficult for us to simulate because of its acceleration capabilities, it's also a bit bigger than our aircraft as well, and we have a very hard time trying to simulate its ordnance, because we do not have a radar that can shoot radar missiles as the '23' can. What we do, is that because we're basically familiar enough with their (Soviet) weapons systems we limit ourselves to simulating the techniques they employ.

RL What sort of speed and 'G' limits are imposed during DACT?

SE Each aircraft type keeps within its own limits, for example the F-5 has a minimum air speed of 100kts, and obviously within the supersonic training area the only upper limit is the aircraft's maximum speed. The F-15 does not have any limits on its speed, whereas the RAF's FGR2 (Phantom) has a minimum speed of 150kts. With reference to 'G' limits, the F-5E is from -3 to +7.3 G, as is the F-15, whereas the F-16 is from -2 to +9.

RL Surely, the higher 'G' limits can confer advantages on some types of aircraft?

SE Yes it does. To get the greatest advantage your ability often depends on how tightly or how quickly you can turn.

RL Does the Harrier, with its vectored thrust, present special problems for you?

SE Actually the vectored thrust isn't that much of a factor; it obviously helps him to turn, but the higher he gets the less effect he gets from vectored thrust, so if we have to fight above 5,000ft the vectored thrust doesn't count for much, but the aircraft itself is a good little fighter.

RL What other types of aircraft do the Aggressors fight?

SE Mainly F-4s, F-15s, RF-4Cs from Zweibrücken as well as from here.

RL Is there any noticeable difference in dogfighting performance between the RAF's Phantoms and USAF F-4Es?

SE Not really; the slats on the F-4E was a good 'mod' and it makes the aircraft much more stable at lower airspeeds. The RAF, as a general rule, don't get down that slow. They've got those big Rolls-Royce engines, they're more powerful, carry more fuel and have pulse Doppler radar. I've flown F-4Cs, Ds, and Es, and the E-model radar was better at air-to-air.

RL What about smoke?

SE GE engines smoke much more; any time you're not in afterburner they smoke and it's a giveaway because on a good day you can see the smoke trail 20-25 miles away. The RAF Phantoms by comparison don't smoke. They do smoke a little bit, but not very much, even when they come out of 'burner'. If I could change one thing about our Phantoms it would be to modify the engines to cut out the smoke; the US Navy has changed them, the National Guard has changed, and the Israelis have changed them.

RL Do you fight tactical strike types?

SE Yes, A-10s, your Jaguars, some F-111s but we don't do much with the '111s' here on the island (Britain), it's mainly at Jever, at the tactical leadership school, a NATO scheme we call TLP — Tactical Leadership Program.

RL What about Buccaneers and Tornados?

SE No we don't fight Buccaneers now, we used to see them at 'Deci' but I don't think they go down there anymore. So far we haven't flown against the Tornado yet.

RL I'm surprised to see pictures of Mirage F1s on the wall, have the Aggressors flown with the French AF, even though France isn't in NATO?

SE We've gone there with the 'package' a couple of times and I've flown against the Mirage III and V and several of our pilots have flown against the F1.

RL Is that a good fighter?

SE Yes it is. Its fairly small. I personally think its probably a pretty good simulator for the MiG-23 — it goes very fast, its about the same size, and it does a credible job. We've also flown against F-104s, Canadian, *Luftwaffe*, and Danish, and in Denmark each year there's a thing called Exercise 'Oksboel' in which we've flown against their F-100s, Drakens and F-16s.

RL Is the F-16 a tough customer?

SE If he sees you, and sneaks up on you, yes he's a tough customer!

RL Of all the aircraft types you have flown against is there one which is more difficult to deal with than the others?

SE The F-16 is such a good airplane that even a bad pilot in an F-16 can do a credible job. I just can't match his +9Gs. In general the F-15 also does a good job in the hands of a good pilot.

RL I know that the 527th F-5s are painted in five widely differing colour schemes. How do the brighter schemes, such as 'Lizard' appear over the North Sea?

SE It stands out very prominently against the background. While with fewer than 20 aircraft and more than five schemes, it's impossible to schedule the best colour for specific deployments, every attempt is made to utilise colours as well as possible. For example, if we're on a 'package' to Germany in winter, with snow on the ground and we're using a brown F-5 we try to put him high, so his colour doesn't show against the ground.

RL Which are the most effective colours for the UK and Europe?

SE 'Patches' is designed for over water: its real good, works well — it works better at 'Deci', 'cos the water's much bluer. It also works in the sky, but the 'Ghost' scheme works best in the sky.

RL I believe the 527th have recently introduced some new schemes?

SE Yes, we've got 'Total Grey' which is just like the F-15, and what we call 'The Frog' to simulate the MiG-23, kinda brown and greenish — at least that's what it's supposed to look like! We're now also painting the undersurfaces of our planes the same colours as on top.

RL Aggressor pilots convert straight on to the F-5E at Nellis without the availability of either a dual-controlled F-5 or a simulator — does this create any problems?

SE No. You're only dealing with experienced pilots and you don't need a simulator. Its a strange feeling though, your first flight in a new type of airplane, and you're solo. You've got an IP (Instructor Pilot) right along in another plane flying with you, but he can't land it for you.

RL How do you like flying the F-5 compared to your previous experience on F-4s?

SE I enjoyed flying the F-4. I enjoy flying the F-5 much more for several reasons. It's a sports car! (Both Steve and Van Sanders drive Triumph sports cars). It's almost a unique job, and I like flying single seat airplanes. I must also say that if well flown a two-seat airplane is a better fighter, simply because of the extra pair of eyes. The F-5 is also very reliable. Obviously as it gets older it starts breaking more often.

RL For how long do you think the F-5E will remain relevant for the Aggressor role?

SE It'll be relevant for as long as it flies: it's a good little airplane, and even though the Soviet threat is changing, the lessons learnt with the F-5 will teach you all the combat situations you're likely to face at the present time.

RL So there are no plans for a successor, such as the F-16?

SE Nothing confirmed, just plenty of rumours. Of course we all have our preferences!

Next it was along to the Officers' Club and after an engaging conversation with Col Jim Rhodes, 10TRW Vice Commander about his experiences while flying the NF-104 as high as 120,000ft above Edwards AFB, there was a chance to talk to people on the receiving end of Aggressor training.

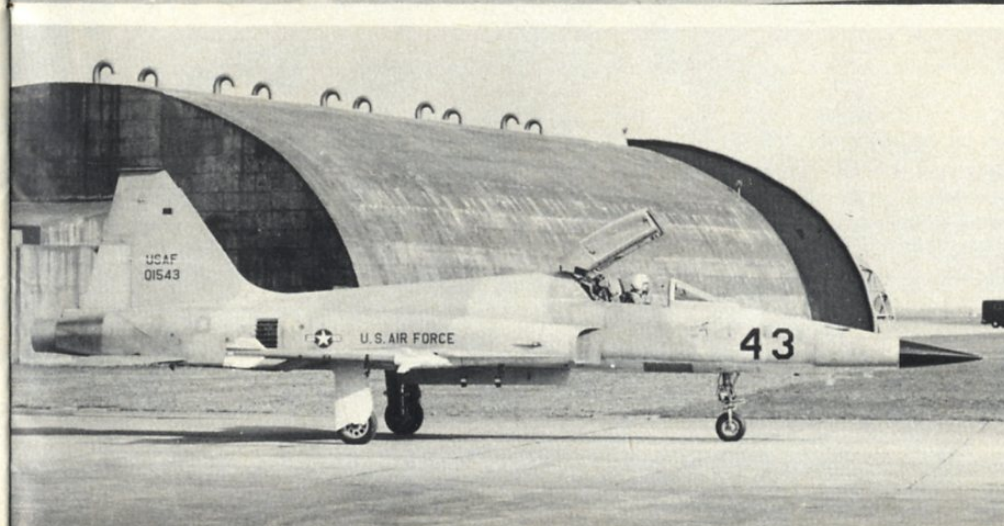
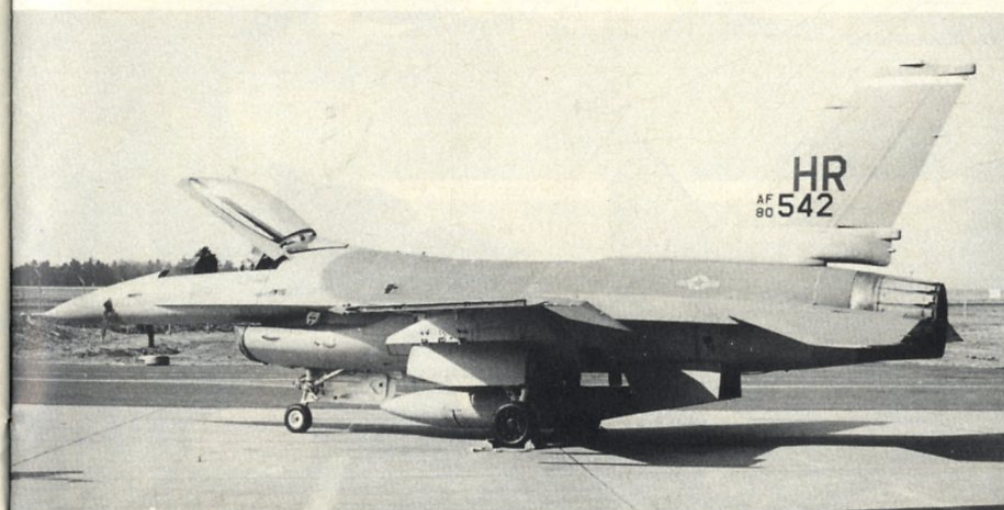
Seven crews of No 56 Squadron, from RAF Wattisham were midway through their week at Alconbury, during which they expected to fly seven combat sorties. They had brought five of their Phantom FGR2s, four of them grey birds, which were operating from a hardstanding on the opposite side of the field to the Aggressors. The two spare crews had come by road from their Suffolk base, together with the team of maintenance men and ground equipment in the charge of the squadron engineering officer. I spoke to one of the 56's pilots, Flt Lt Dick Woollam, shortly after he had returned from a two versus one encounter, the imprint left by his oxygen mask still fresh around his face. Dick was fairly new to the fighter business, and until a year previously had been flying as a co-pilot on Vulcan bombers. He said that prior to going to Alconbury the deployment crews had been given a briefing on the DACT course and on some of the tactics and techniques employed. Asked for his impressions of the course thus far, he replied that the opportunity to face the F-5 was a useful experience since that aircraft equated more closely to fighters in the Soviet inventory than to other Phantoms which normally provided the majority of interception and dogfighting experience for the squadron. Questioned about how difficult it was to see and keep track of the F-5 in a combat training engagement, Dick had this to say: 'The F-5 is very difficult to see, mainly because it's so much smaller than most of our normal "trade". In a one versus one it causes you to be very defensive, because it takes you all your time to keep it in view, even though it still smokes, though nothing like the Tornado. We're in afterburner most of the time during a DACT sortie due to the intense activity. While we're here we fly with a clean aircraft apart from the acquisition Sidewinder on an inboard pylon'.

When I quizzed Dick about G-limits he said that although the Phantom FGR2 was stressed for over +7G, restrictions reduced this to between +5 and +6G in the interests of prolonging the active life of the airframe. Dick's navigator was, rather surprisingly, an American, Lt Stew Ivey, US Navy, who had managed to get a backseater's job with No 56 by dint of determination. Originally an A-6 'nav' on an exchange posting to the Royal Navy, he discovered soon after arrival in the UK that the Buccaneer squadron to which he was assigned had been disbanded with the paying off of HMS *Ark Royal*. After some delays he managed to take the RAF's Phantom 'nav', course at 228 OCU Coningsby, and then on to No 56 Squadron, where he seemed to be enjoying himself — I even detected a trace of RAF slang! Like the Aggressors and most other fighters involved in DACT, the RAF Phantoms carry a tape recorder which picks up the intercom and R/T conversation during the sortie, when



Above: With Lt Col Van Sanders at the controls, F-5E 74-01547 is taxied-in at RAF Alconbury at the end of a DACT mission. The plain fin tip indicates that this aircraft had not yet been modified with an ILS; note the airbrakes still extended beneath the fuselage.

Below: 'The F-16 is such a good airplane that even a bad pilot in an F-16 can do a credible job'. The F-16 is certain to become a more frequent visitor to Alconbury for DACT with the 527th TFTAS, especially with the re-equipment of the 50th TFW at Hahn AB, Germany. This example, photographed in March, is from the 313th TFS. Photo: John Kuehnert via the author



Right: Lt Col Van Sanders, operations officer 527th TFTAS.

Bottom: 'Ghost' F-5E, 54-01543, taxis out for a DACT sortie, with AIM-9J (captive) Sidewinder missile on the starboard wingtip rail.

there's usually a running commentary between navigator and pilot. 'We also have a film of the radar scope, which is useful when we assess the sorties afterwards, while the voice tape indicates when we fired anything — "Fox 1" means a Skyflash launch, "Fox 2" a heat, and "Fox" for the gun,' explained Dick. I asked him about the effectiveness of the new(ish) barley grey/air superiority grey scheme which is now being applied to the RAF's Phantoms, to which he replied 'Almost all our trade is out over the sea where the grey is very good, and it's also very effective when viewed against many types of cloud background — it's much better than the spotted scheme, although it shows up the scuff marks'.

As Steve Emery headed out for the North Sea in a Lizard F-5E on a full profile FCF (Functional Check Flight) after the aircraft had emerged from major overhaul and been modified with ILS gear, I headed for home, too, pausing only for a final word with the 527th's Operations Officer, Lt Col Van Sanders. Van is an F-4 Vietnam veteran, and since then he's had tours on F-104s at Luke AFB in Arizona, and secondment to the Royal Saudi Air Force, helping bring their F-5A and F-5E squadrons to operational status. In reply to my question about what Aggressor flying meant to him he summed it up so succinctly: 'The most rewarding thing for an Aggressor is to teach a student at the beginning of the week, see his learning curve rapidly increase, and then have him shoot you on the final flight!'

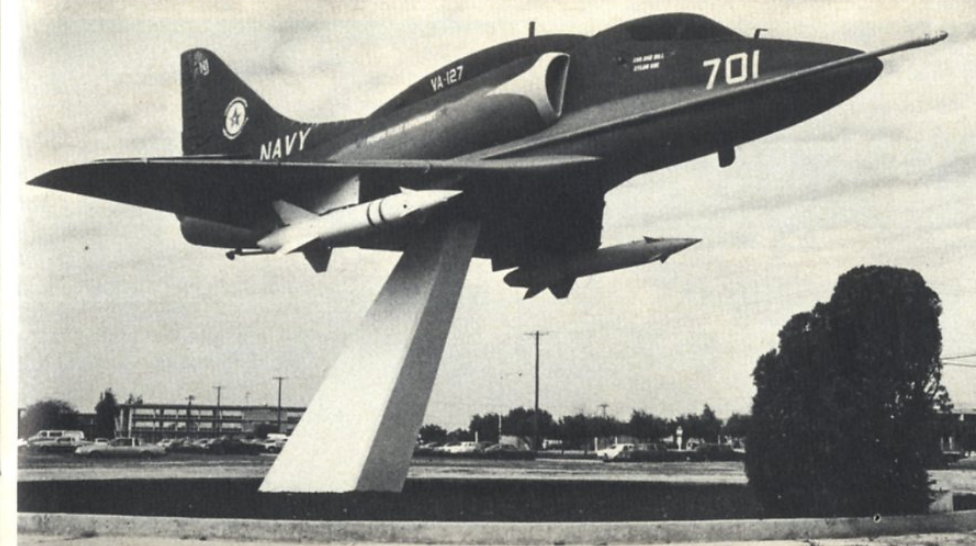
'ROYAL BLUES' TURN RED

Photo report by **Frank B. Mormillo**

ALTHOUGH the Aggressor-orientated air combat manoeuvring (ACM) training programmes that originated at NAS Miramar (Top Gun) and Nellis AFB (Red Flag) are perhaps best known, one must not forget that there are also active Aggressor units at a number of other USAF, USN and USMC airbases in the US and overseas. While these 'home base' squadrons usually employ A-4 Skyhawks and T-38 Talons in a less sophisticated ACM operation than is possible at Miramar and Nellis, they nevertheless bring a valuable measure of realistic

ACM training to many units that do not ordinarily get enough access to the more formalised and intense Aggressor programmes. At NAS Lemoore, Ca VA-127, the 'Royal Blues', serves as the resident Aggressor squadron. The unit was first formed at Lemoore as a detachment from Attack Squadron 126 on 25 July 1961. Equipped with TF-9 Cougars, the original squadron held the distinction of conducting the first scheduled jet flying from the then newly commissioned NAS Lemoore.

In 1962, the 'Royal Blues' was com-



Facing page: US Navy A-4F and TA-4J Skyhawks being prepared for an ACM training mission from NAS Lemoore, Ca.

Left: Although the A-4C Skyhawk 'gate guardian' at NAS Lemoore is displayed in VA-127's markings, none of the squadron's aircraft have actually been observed in this particular two-tone grey camouflage scheme.

Centre left: The Aggressor-style and standard colour schemes can be compared on these two TA-4J Skyhawks on the VA-127 flightline.

Bottom left: This VA-127 TA-4J sports a temperate land-type camouflage scheme.

Below: A VA-127 A-4F departing NAS Lemoore at the start of an ACM sortie. The aircraft carries Soviet-style numbers beneath the cockpit and a red star on the tailfin.



missioned as Attack Squadron 127 and, until 1970, primarily served to provide the fleet with all-weather jet instrument training. During that time, VA-127 transitioned to the TA-4 Skyhawk and, after adding some single-seat A-4 Skyhawks to its inventory in 1970, the 'Royal Blues' officially became the only A-4 replacement air wing in the US Navy. VA-127's mission at that time was to provide training for fleet replacement pilots, base and refresher instruction, together with instrument and fleet replacement aviation maintenance training.

In the summer of 1975, VA-127 was directed to revert to a readiness instrument training squadron and a secondary mission of providing ACM adversary instruction was assigned to the squadron in November 1975. Currently, the 'Royal Blues' employs the TA-4J and A-4F versions of the Skyhawk to accomplish its multiple training missions, including its ACM adversary role. In deference to the latter-mission, most of VA-127's Skyhawks have been painted in a variety of Aggressor-type camouflage schemes with Soviet-style numbers on the noses and small unit badges on the tails being the only distinctive markings.

A VISIT to Southend to view the sea can lead to disappointment or a two mile hike along the famous but decaying pier. A far more reliable objective is the Historic Aircraft Museum situated adjacent to the airport and within easy reach by bus or car.

It is now 10 years since the doors of the brand new complex opened to the public. The well cared for exhibits display no hint of the years of uncertainty which surrounded the creation of such a museum, or how close some of the valuable possessions came to becoming just scrap material.

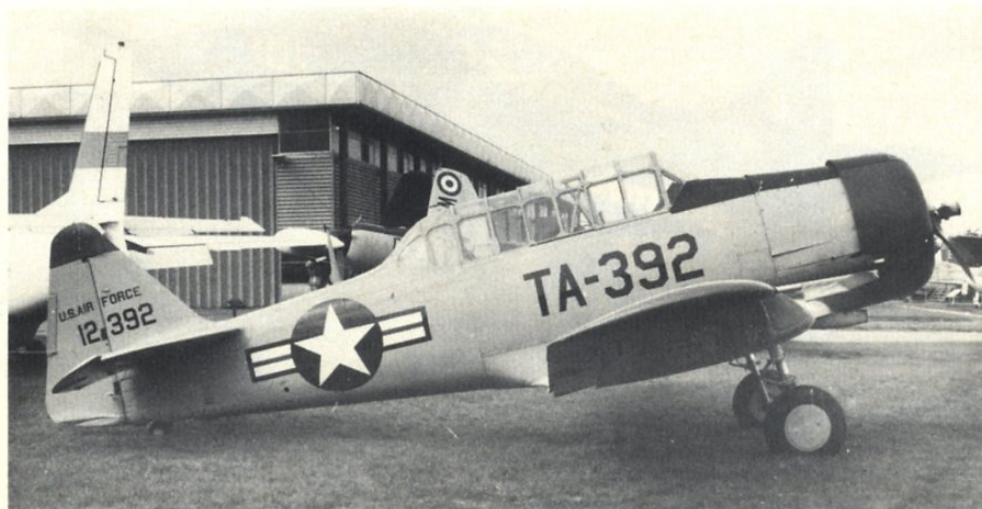
The earliest acquisitions spent several years alongside the eastern boundary of the airport awaiting a decision concerning their future. As the money ran out, so the deterioration accelerated, particularly in the case of the fabric-covered types. Storms and gales played havoc and it was not until it was almost too late, that the local group of enthusiasts found a company willing to back the venture. Work started in 1971, enabling the newly created compound on the western perimeter of the airport to receive the exhibits for restoration while the building work continued.

At the grand opening on 26 May 1972, the accommodation available was found to be impressive, the facilities certainly being superior to most other UK aviation museums at the time. Many of the aircraft present then still remain on display today, principally because of their sheer size and the physical problems in moving them elsewhere.

By far the largest exhibit is the Beverley XB261, flown in on 6 October 1971 and subsequently taxied across the adjoining land and road to its final resting place. Almost 11 years later it begins to show signs of its continued exposure to the elements, its markings fading although the Aircraft and Armament Experimental Establishment titles of its former operator are still plainly visible on the fuselage. The Beverley's neighbour in the corner of the compound is the Lincoln RF342 that is displayed in its later test markings of G-29-1. After experimental work with Napiers, it continued in similar employment with the College of Aeronautics at Cranfield before retiring to Southend.

Another of the early exhibits was the B-25 Mitchell which had been a part of the landscape at Biggin Hill for some years after use as a camera ship for the films *633 Squadron* and *The War Lover*. At Southend there was another delay before finally it was restored to represent VO-A of No 98 Squadron with the serial HD368. This too has stood alongside its larger companions since the opening, although some refurbishing work has been carried out in the meantime.

Size considerations have also condemned others to an outdoor life since arrival. Seahawk FGA6 XE489, painted to represent XE364 of No 899 Squadron, a veteran of the Suez campaign, Meteor T7 VZ638, Javelin FAW9 XH768, Sea Fury FB11 WJ288 and Vampire T11 XK625 all have semi-permanent parking spots, but with regular attention are maintained to good exhibition standards. The Saab J-29F 29640 proved an unusual item when donated by the



The Historic Aircraft Museum, Southend

Alan Wright



Swedish AF as long ago as June 1967, followed much later by the F-84F FU-6 from Belgium.

Some time after its film career ended, the ex-Spanish CASA 2111 was added to the collection, retaining its He111 *Luftwaffe* appearance which proves a popular attraction for visitors. Yet another rarity, certainly in the northern hemisphere, is the DHA-3 Drover VH-FDT. It was originally shipped from Australia for use at Blackpool as G-APXX, but bringing it to airworthiness condition proved uneconomic. It was acquired by the Southend Museum where it was eventually painted as a typical example of the Australian Flying Doctor Service. When the Harvard arrived it was still in its Norwegian civilian state as LN-BNM. After a period in a natural metal US scheme, it has since been changed to a yellow finish carrying its true identity of 12392.

Ideally all exhibits should be under cover, but all those listed are capable of an outdoor life providing the effects of weathering is carefully monitored. Such was the case with

the Drover and CASA 2111, when by early-1982 there were definite signs that some attention was becoming a matter for some urgency. Work was started on the latter to give it a repaint and overhaul to bring it back to an acceptable standard. On completion it is hoped that the Drover will be next in line to prevent further deterioration. However with limited resources, exhibits have to take their turn in some form of priority order.

The main exhibition hall normally contains the less hardy specimens, which do tend to change from time to time. It was indeed the declared intention at the outset to rotate the aircraft on view on a regular basis to lend variety which in turn would retain public interest. Again it is of course much easier to manoeuvre the lighter types through the comparatively small entrance door and out of the compound, bearing in mind that even this involves much re-arrangement of the valuable possessions each time it is done. Not surprisingly a number of the aircraft are permanently on display.

One of the original members of the collec-



Top left: Part of the compound at the Historic Aircraft Museum, Southend, featuring the Harvard exhibit that is now painted up as an AT-6 with its identity 41-2392 carried on a yellow finish. All photos by the author

Above: Provost T1, WV483, 'taken under wing' by the largest exhibit at Southend, Beverley XB261.

Below: The only example in the UK, Drover VH-FDT is now overdue for refurbishing.

Bottom left: Tiger Moth G-ANPE has been a long time resident and is seen on display in the Exhibition Hall at Southend. Presently being restored, it is to be re-registered G-IESH.



tion, Proctor 4 NP303 was restored in RAF livery after a civilian life as G-ANZJ with Cambrian Airways, although its survival was only possible with the donation of the wings from G-AOBW. Fiat G-46 MM53211 ZI-4 for many years was shown in anonymous form. Even now its identity remains unknown, but has been given a typical Italian AF marking.

A foreigner with a less obscure past is the Fieseler Fi156 Storch. German built, it served for some years with the Swedish AF before passing through civilian hands in Austria as OE-ADR and Germany as D-EKMU. It was in the latter guise that it flew into Southend after the 1972 opening to be restored to a wartime desert camouflaged example. There is a hope that the work involved to bring it back to an airworthy state would not be prohibitive, but this still remains a long term project.

Another arrival awaited with great interest the same year was that of the Cornell N9606H from America. It was not so lucky as its companions since it was badly

damaged in transit, spending its subsequent life at Southend gradually rotting away. During 1981 the decision was taken to save this rare machine before it was too late. Work is now well in hand with the restoration which, when completed, will provide the only example of the type in the UK. Another project underway is the rebuild of Tiger Moth G-ANPE by its owner, although the airframe is to be seen in the Hall.

Likely to beat the Storch into the air again is the resident Dragon G-ACIT, which ended its previous flying career much more recently than the German machine. This has in fact been inspected and it was not found to be an unrealistic task for the fairly near future. For some years it was surrounded in the Museum by other fine examples of the de Havilland family, mostly various Moths. All airworthy, they frequently visited flying events, but eventually the collection was dispersed, the owner retaining only the Fox Moth, Puss Moth and Moth Minor. These too left the sanctuary of Southend for the vintage surroundings of Old Warden from where they

are still flown. Other types to have left in recent times have been the Mignet HM293 G-AXPG, Stampe SV-4 G-AWIW and the Gadfly G-AVKE.

The void was filled to some extent by the arrival of the Piaggio P166 G-APWY on 19 February 1981, donated by Marconi Avionics. This machine also flew in, taxiing into its position in front of the reception committee for the formal presentation. This year has seen the appearance of the Topsy Belfair G-APOD, a machine expected to be a semi-permanent resident, although capable of making the occasional sortie when required by its owner.

The Hall was also used in the winter of 1981-82 as accommodation for the Leisure Sport fleet of WW1 replicas. As well as serving a practical purpose for the aircrafts' wellbeing, it added to the Museum's attractions in a traditionally slack period. Similarly Pilatus PC-6 G-BONE spent its first months in the UK at the Museum before departing for airworthiness work to be completed elsewhere.

Among other exhibits is to be found the flight deck section of the Viscount G-AVHE. Sadly this is the only reminder of the locally based Channel Airways' 26-year presence and even this was misguidedly repainted in British Midland livery for exhibition purposes in the early-1970s. Fortunately it is hoped that the stencil for the Channel insignia is still available which will allow the Museum to restore the section to its former appearance.

Like all such organisations, there is seldom sufficient manpower and never sufficient money. Although rooms were incorporated at the design stage for conference purposes, meetings etc, it has also been found necessary to hire the main hall for the use of special exhibitions, not necessarily related to aviation. Prior to these functions, all the aircraft have to be manhandled out into the compound. During these periods the museum is closed as it will be from 23 August to 9 October and 1 November to 4 December 1982, the special events including a Competition Motor Cycle Show.

While not an ideal arrangement, it does provide money and publicity, both valuable commodities. The members of the Historic Aircraft Society provide the enthusiasm and workforce to maintain the exhibits, but the museum is itself run as a commercial organisation by Mr Ian Huddleston, the general manager of the whole complex and the curator, Mr Bill Gent. The combined efforts of everyone involved has kept the museum alive, so any inconvenience is a small price to pay for the continued existence of this somewhat under patronised Collection. It does after all contain many items of interest not duplicated in similar establishments.

It is open at weekends from 10.30hrs — 16.30hrs except during the dates quoted, admission for adults being 75p and children 40p, under fives are free. There is a shop in the building from which various books and kits can be obtained. After such a visit, a trip to the promenade might even be rewarded with a glimpse of the sea!

**airview
SPECIAL**

FALKLANDS POSTSCRIPT

Peter R. March

WITH hostilities now well and truly over and Task Force ships and aircraft returning to the UK, details are now beginning to emerge of some of the special measures that were taken back in April and May, losses of Sea Harriers and helicopters in the conflict, and steps being taken by the government to restore the Fleet Air Arm to its former strength and make some measure of expansion for the future.

It has now been announced that No 809 Squadron officially formed at Yeovilton on 8 April and was commissioned on 27 April. It was formed from No 899 Squadron which disappeared for several weeks to re-emerge in early June. The UK Secretary of State for Defence, Mr John Nott, announced in Parliament that 28 Sea Harriers went to the South Atlantic of which seven were lost, three in accidents and four were shot down by ground-fire. In addition a further aircraft was lost at Yeovilton (XZ438) on take-off from the ski-ramp. The first quartet of surviving Sea Harriers arrived back at Yeovilton on 19 July, from HMS *Hermes*. The Government has ordered a replacement batch of 14 Sea Harriers to strengthen the three front-line squadrons and headquarters unit.

Little has been said about the extensive changes made involving RN Wessex HU5 squadrons. On 27 April No 848 Squadron was re-formed from No 707 Squadron, taking over the training unit's helicopters with the addition of XS523, XS480, XS495, XS499 and XT482. Early in May No 847 Squadron was formed from Nos 771 and 772 Squadrons and embarked on the *Atlantic Causeway* at Plymouth on 13 May

with: XS514/XA, XS515/XB, XT472/XC, XS516/XD, XS506/XE, XS479/XF, XT475/XG, XT757/XH, XS488/XK, XT469/XN, XS518/XP, XT480/XQ, XT486/XR, XT766/XS, XT773/XT, XS507/XU, XT466/XV, XT471/XW, XT755/XX, XT759/XY, XT456/XZ. On the same day the Sea Kings of the newly formed No 825 Squadron were also embarked: XV700, XV696, XV663, XV659, XV654, XV714, XV656 and XZ580. The exact number of Sea Kings lost in the South Atlantic is not yet known but an order for 16 aircraft, eight Commando HC4s and a similar number of HAS5s was announced by Westlands; there is some conjecture that five of the Mk 5s will be completed with airborne early warning (AEW) capability.

On 14 July the Sea King HC4s of No 846 Squadron returned to Yeovilton, having disembarked from HMS *Fearless* off Plymouth. Eight helicopters flew in: ZA292/VH, ZA293/VK, ZA296/VF, ZA297/VG, ZA298/VA, ZA299/VE, ZA310/VS and ZA313/VZ, joining ZA312/VW which formed the backdrop for a celebration party in the Squadron's hangar. The Commanding Officer Lt Cdr Simon Thornewill led the formation, not in one of the Sea Kings, but in a captured Argentinian Agusta A109-A AE334/VV, painted up in Royal Navy markings and roundel with the squadron title on the nose but retaining the Argentine roundel under the fuselage. A second A109-A AE331/CC painted in Royal Marines colours

brought up the rear of the formation. These two 'spoils of war' had been abandoned by the Argentines on the race course north of Port Stanley and were fully armed with 70mm rockets when captured. They remained in the gunship configuration for the return to Yeovilton. After public display it is likely that they will end up in the Fleet Air Arm Museum at Yeovilton.

Turning now to the RAF, it was announced by Mr Nott that three Chinook HC1s were lost with the sinking of the *Atlantic Conveyor*, with only one survivor of the No 18 Squadron quartet on board, this being ZA718 coded BN. The 11th hour rescue of Vulcans from the scrap heap for bombing, surveillance and tanker duties in the South Atlantic has meant that over 30 of the type have been kept airworthy at RAF Waddington. Several of the aircraft that were detached to Wideawake Airfield, Ascension Islands were given Falklands grey undersides and fitted with underwing pylons for Sparrow, Martel and other missiles for defence and anti-ship tasks. One such aircraft, XM597 of No 44 Squadron diverted to Brazil when it damaged its refuelling probe and could not take on sufficient fuel from the Victor tanker to return to Wideawake. The Vulcan was subsequently disarmed by the Brazilians before it was released to return to the UK. Known Vulcan conversions to K2, with a single fuselage mounted refuelling drogue, are XJ825 and XH561 and possibly XM571. It is thought that six Vulcans will be converted as a stop-gap measure until the

AIRCRAFT ILLUSTRATED



Far left: An RAF Nimrod MR2 maritime reconnaissance aircraft taking on fuel from a No 57 Squadron Victor K2 tanker. Within two months of the start of the Falklands crisis, a number of Nimrods had been modified with the air-to-air refuelling probe and this enabled the aircraft to fly sorties from Ascension Island down to the Falklands and surrounding areas. A self-defence capability was given to the Nimrods with the fitment of air-to-air AIM-9L Sidewinder missiles and the Nimrod MR2s were also adapted to carry the anti-ship Harpoon missile, this being a stopgap measure until the BAe Sea Eagle is introduced in 1984. Photo: Ministry of Defence



Top left: After being hit by an Exocet missile, HMS *Sheffield* was lost on 4 May 1982, and it is now known that the Type 42 destroyer's Lynx HAS2 was also a victim of the devastating fire. The Type 21 frigate, HMS *Arrow* was seen closing in, spraying water from its hoses to help with firefighting duties as a Sea King helicopter hovers overhead. Photo: Ministry of Defence/Press Association

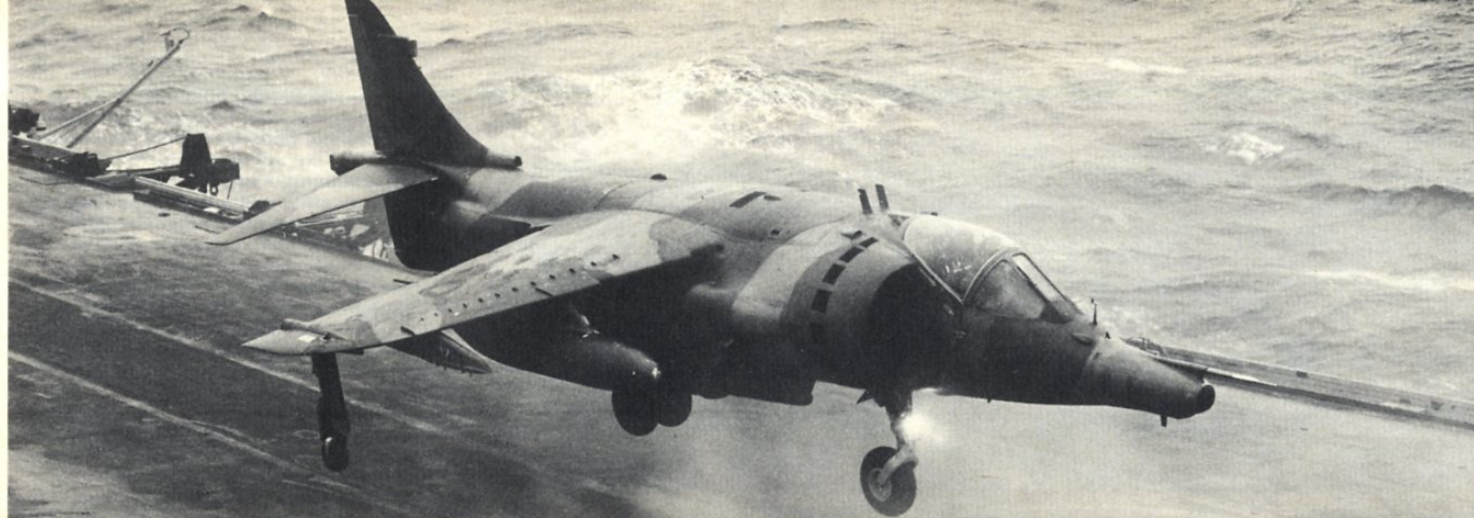
Centre left: A crowded flightdeck aboard HMS *Hermes* with RAF Harrier GR3s, Royal Navy Sea Harrier FRS1s and a Sea King helicopter; note the Paveway laser-guided munitions carried by the Harrier in the foreground and the Sidewinders on the Sea Harrier. Photo: Crown Copyright/C-in-C Fleet

Below: Landing craft depart HMS *Fearless* during the Task Force assault on the San Carlos bay area on 21 May. A little over three weeks after the beach-heads on East Falkland had been attained, the Argentine forces surrendered and, in the words of Maj-Gen Jeremy Moore (the UK Land Force Commander), the islands were 'once more under the government desired by their inhabitants — God save the Queen'. Photo via Rediffusion



new VC10 tankers become available. A caption error last month credited the date of the first flight of the VC10 K2 ZA141 as 22 April; it should have read 22 June.

The Army and Royal Marines lost an undisclosed number of Scouts and Gazelles during the conflict. These will be replaced by five additional Gazelles bringing the total order book for the three services to over 250. An additional order for three Lynx for the Royal Navy confirms the report that 'several helicopters were lost when the two destroyers *Sheffield* and *Coventry* and the two frigates *Antelope* and *Ardent* were attacked and burnt out', one of these is known to have been a Wessex HAS3. These three Lynx will be the new HAS3 development with the up-rated powerplant and other refinements, of which the first example to be delivered, ZD250, was in service with No 702 Squadron from mid-May.



Above: An RAF Harrier with bomb racks empty lands on HMS *Hermes* after completing a mission over Port Stanley.

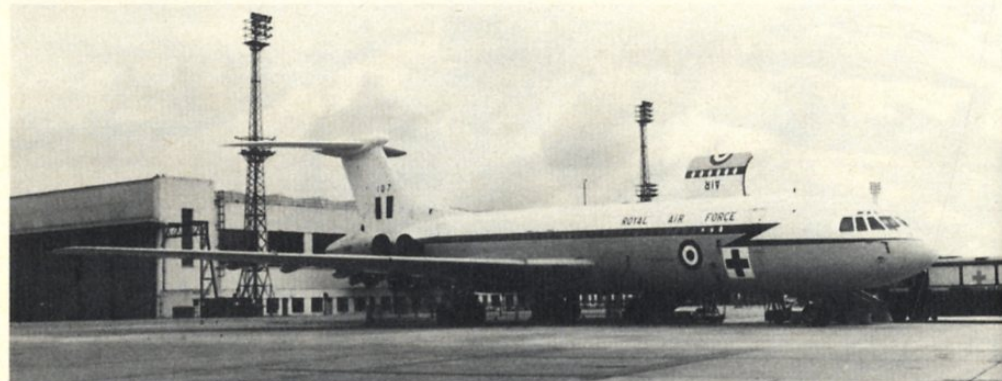
Photo: Crown Copyright/C-in-C Fleet

Right: No 10 Squadron VC10, XV107, at RAF Brize Norton on 12 June and carrying a red cross signifying its role as a MEDEVAC aircraft during the Falklands campaign.

Photo: Peter R. March

Below: Three RAF Chinook HC1s were lost with the sinking of the *Atlantic Conveyor*, with only one survivor of the No 18 Squadron quartet on board, this being ZA718 coded BN; seen ferrying fuel tanks to shore.

Photo: Crown Copyright/C-in-C Fleet



Above right: The first Sea Harrier on HMS *Fearless* flightdeck in San Carlos Water. In the background are the Royal Fleet Auxiliary landing ship *Sir Percival* and the ferry *Elk*.

Photo: Crown Copyright/C-in-C Fleet

Right: HMS *Illustrious*, the second of the 'Invincible' class of RN aircraft carriers, arriving at Portsmouth on 21 June 1982. In July the carrier put to sea and was believed to be heading for the Falkland Islands as a replacement for HMS *Hermes* which returned to the UK on 21 July.

Photo: Mike Lennon



airshow 82

Peter R. March

A shortage of space in the August edition precluded the usual review of some of the first major events of the 1982 season including the Biggin Hill Air Fair and Mildenhall's Air Fete 82. To put matters right we are looking back over some of the highlights of the past two months, beginning with the Biggin Hill Air Fair on 15-16 May, a pleasantly varied event which brought in at least one type new to the UK display scene, Stephen Grey's magnificent F-8F Bearcat NX700H. Sadly the other newcomer to Biggin Hill, Robert Lamplough's Hispano HA1112 G-BJZZ, was badly damaged in a landing accident on the morning of the first day; having been practising with Ray Hanna in the Spitfire, and landing on the tarmac runway after an overshoot on the grass, it groundlooped causing the port undercarriage to collapse. Damage was estimated at £50,000 and will necessitate a long period back in the workshop if it is to fly again. There was a welcome appearance of the *Patrouille de France* with its brightly painted Alpha Jets, giving a display which showed a marked improvement on last year, with a number of novel manoeuvres which seemed to impress the watching 'Red Arrows' pilots. Ray Hanna gave his usual low-level display in the Spitfire MH434 and Pilatus P2 G-BJAX. The Army Historic Flight had the addition of Auster T7 WE569/G-ASAJ in the static display. Among the other participating aircraft were B-17 'Sally B', B-25 'Big Bad Bonnie' and Dakota 'Vera Lynn', the RAF put in a Chinook and a Tornado and the Navy displayed the Historic Flight. Many light aircraft were attracted from all over Europe, but most were parked well out of the sight of the public. In a very varied static display most of the participating aircraft could be seen at close quarters and the vintage park included several Harvards, Stampe F-BDNF, Auster Arrow G-AJAM and the Phillip Mann owned Rearwin Cloudster G-BGAV and Arrow Sport G-AARO. Other new items about were the ICA-BRASOV IS 28B2 G-BKAB and Bandeirante OY-ASL now operated by Centreline in Dan-Air colours.

RAF Coltishall's Families Day on 15 May was a good deal bigger than expected with static display participation from the Dutch AF with NF-5B K-4017 of No 314 Squadron, Canadian Forces with CF-104 104821, the USAF with A-10A 79-0131 of 81TFW, and RF-4C 69-0368 from 26TRW and Norwegian AF with F-16B J-270 alongside a good selection of current RAF types and an abundance of Jaguars. In contrast the first of the new style Shuttleworth Informal Flying Occasions held on 16 May was a very quiet and relaxed affair. Some half a dozen of the Collection's aircraft were flown in a leisurely manner and displayed to their full advantage particularly for the benefit of those with cameras. It was especially pleasing to see the Parnall Elf

G-AAIN making one of its rare appearances in the programme.

Air Fete 82 at RAF Mildenhall on 29-30 May lived up to expectation of what has now become the USAF's largest event in Europe, although there was some drop in the number of NATO countries that participated this year. There were several firsts for the event, the most notable being the appearance of a Lockheed U-2R 68-10337 in the static display on 29 May. Although the type has been in and out of the UK for over 20 years it has never before been officially shown to the public. Likewise two examples of the E-3A Sentry, making their changeover in the Middle East, were shown, one on the first day departing in the evening and another arriving during the Sunday display. A third new USAF type was the KC-10A Extender 79-0433 which arrived on 30 May, having had technical problems en-route from the USA. A great deal of interest was also shown in the SR-71A 64-17974 from the 9th SRW which was making a rare appearance, though not for the first time. The sight of a B-52G Stratofortress in the flying display on the second day was unexpected and was the first public display by the type in the UK for nearly 20 years. Missing from the line-up was an F-16 Fighting Falcon, now in service at Hahn, but that is a treat which can be looked forward to next year. Stephen Grey's expected Wildcat was held up on its delivery flight in Canada, but its place was taken by the Bearcat NX700H.

The Battle-Attack air show at Elstree on 30-31 May was a big let down, perhaps one could say a damp squib. The promised participation could not be mustered and only half-a-dozen or so machines took part, the pyro-technic flak etc was unimpressive and the ground support was thin in terms of actors and equipment. The B-25 was seen to carry a new tail code '8U' and Harvard III G-SUES was shown in an attractive US Navy colour scheme.

Up at Prestwick the HMS *Gannet* Air Day on 5 June was a smaller affair than expected, but this was hardly surprising with so much Naval equipment so far away. There was a good static display which included Neptune 210 of No 320 Squadron and Lynx 268 from the frigate *Van Nes*. The flying programme was dominated by the Sea Kings of No 819 Squadron, although the resident British Aerospace also managed to get in with Jetstream 31 G-JSSD and BAe 125 srs 700 G-BFAN.

There was a large entry for the Bournemouth Air Race at Hurn on 6 June, this being the first of this year's National Air Races leading up to the Kings Cup Air Race in September at Finningley. The RAF had two entrants, a Bulldog from Yorkshire UAS

Lockheed U-2R, 68-10337, made the first UK public appearance of the type at Mildenhall on 29 May.

Photo: Andrew March

and a Chipmunk from the PFS and unusually the Army Air Corps entered a Beaver XP820 from Middle Wallop. Among the various other light aircraft was Harvard FT391 and Falco G-FALC. The race was won by local Cessna 152 G-BGLN followed by Rockwell Commander 114 G-WJMN.

The first RAF Open Day at Brize Norton on 12 June was marred by the fatal accident to veteran glider pilot Andy Gogh, killed when his Blanik broke up after he had performed a spin and outside loop. There was a varied and interesting static display with the first public appearance of a Tornado from No 9 Squadron, ZA590/E, a grey Lightning F6 with overwing tanks XR759, a VC10 wearing a large red cross on the fuselage sides and most of the current front-line and training aircraft types represented. The flying display included the Queen's Birthday Flypast — nine Tornados and a solitary Vulcan — Provost G-AWPH and Richard Goode's new Stephens Akro G-OODO.

The Colt National Helicopter Fair was held at Cheltenham Race Course on 19 June and attracted 20 entries for the Helicopter competition and a similar number for the hot-air balloon 'hare and hounds' competition. Of particular interest among the helicopters was Brantly G-AWDU, Robinson G-BISC and Jet Ranger G-NOEL (guess who owns it!) the turbine helicopter sporting wire cutters in front of the cabin. The winner was Bill Gray from Cambridge flying Enstrom G-BFFN, with two of Colt Executive Aviation's Ecureils in second and third positions. Among the hot-air balloons were two foreign registered examples, Cameron 77 I-TINY and Thunder-Colt Ax8 D-VOGT. A small flying display included the Colt display team of three Ecureils using the name 'The Red Diamonds', Harvard FT291, Super King Air G-MCEO, Gazelle XW870 from Shawbury and Wallis G-ARZB.

Plymouth Airport's Open Day on 20 June was mainly an opportunity for operators Brymon Airways to show off its DHC Dash 7 G-BRYC and some of the Twin Otter fleet. Notable also were Cheyenne N41RC which gave a spirited flypast and recently restored Auster 3 MT438/G-AREI which now looks very much a 1942 aeroplane in its camouflage markings. On the same day the RAF held an Open Day at Swinderby. This presented a rare opportunity to view the three RAF Museum aircraft still stored at the airfield: Mosquito TT35 TJ138 Canberra PR7 WT520 and Vampire T11 XD506. Also present of



Top: Alistair Sutherland's Evans VP-1, G-BFAS, was judged to be the winner of the trophy for the best home-built at PFA Cranfield. It made an epic journey from Inverness to win the award for the most meritorious flight.
Photo: Andrew March

Above: Lynx HAS3, ZD250, was the first of this new mark to arrive for No 702 Squadron at RNAS Yeovilton in late-June.
Photo: Peter R. March

interest were Tiger Moth T5493/G-ANEF and the new Pixter Elf, a diminutive homebuilt yet to fly. The flying programme comprised what has now become the established pattern for RAF Open Days, with the Battle of Britain Flight, the 'Red Arrows' and various supporting items. Surprisingly absent from the proceedings were

the based Chipmunks of the Flying Selection School.

The Popular Flying Association's International Air Rally at Cranfield on 2-4 July was a great success, not least from the point of view that it has at last found a satisfactory venue. The event which gets bigger and bigger every year, had out-grown Sywell and for the past three years had an awkward lodging at Leicester trying to fit a quart into a pint pot. Cranfield with its space, long runways, grass strip and excellent aids and facilities proved an ideal venue. The general pattern set by the Flight Business and Light Aircraft shows was followed, with visiting 'modern' aircraft parked together at the eastern end of the airfield, homebuilt and microlights in the central area, with further parks for veteran and vintage types and Jodels to the west. The space also permitted owners to set up camp by their aircraft if they so wished, in the designated camp site. The whole event seemed a great deal better organised by having the room and hence much safer for all concerned, despite the fact that there was a record turnout. With generally good weather until the last afternoon it was a bit surprising that more homebuilt aircraft did not participate and with some bad flying conditions over part of the Continent the expected Swiss invasion did not materialise, hence the numbers being made up from hordes of modern metal machines.

This year's best homebuilt was judged to be Alistair Sutherland's Evans VP1 G-BFAS. Not only is it a beautifully pro-

duced machine but it also made the most meritorious flight, in a nine-hour journey from Inverness. Close runners-up for the Air Squadron Trophy were Richard Teverson's Steen Skybolt G-BGRT and Ivan Shaw's Rutan VariEze G-IVAN. The Randall Trophy for the best vintage aircraft was awarded to the Super Ace G-AKVF with runners up the Monocoupe G-AFEL and Argus III HB-EPP. The Personal Plane Services award for the best Tiger Moth went to DE992/G-AXXV, the best group operated aircraft was Sprite G-BCWH, the best Jodel was G-GOSS a DR221, the best replica was Bleriot XI G-LOTI, the best gyroplane was Cricket G-AYHI and the best commercial replica was EMK Aeroplane's Sopwith Pup G-BIAU. In the *concours d'elegance* competition the three prize winners had all received awards: first was Skybolt G-BGRT, second was Jodel G-GOSS and third the Monocoupe G-AFEL.

There was a sizeable turnout of microlights at this PFA Rally for the first time, and a separate park was a set aside for this new breed. Of special interest was the Whittaker MW4 G-MBTH, designed and built in Bristol by Mike Whittaker who, several years ago showed his MW2 G-BDDX at Sywell rally. The MW4 was flown for the first time by Graham Andrews, a former Rolls-Royce test pilot, at Filton on 25 June. Among the interesting vintage and veteran visitors to Cranfield mention should be made of KZ2 OY-FAK, now converted back to open cockpit configuration, Safir G-BCFV painted in Swedish AF colours, Cessna 140s G-AHRO and G-ALTO, Luscombe Silvaires G-AFYD and G-AFZN, Stearmen G-AZLE and G-ROAN, Dragonfly G-AEDU, Aeronca G-AEFT, Swallow G-AFGD and many more. De Havilland types were well down on previous years, particularly Tiger Moths, as 40 of the type were taking part in the Moth Rally from Hawarden to Hatfield, Farnborough and Henlow. This also coincided with the British Aerospace Open Day at Hatfield. A feature on this event will appear in next month's issue.

Typical of the displays organised by the various branches of RAFA, the Exeter Air Display on 10 July had a good mix of items, both civil and military and was well attended as a popular family event. Unusually the 'Red Arrows' had a technical problem with one of the Hawks and performed with eight aircraft, but such is their flexibility that it was hard to see that one was missing in many of the formations. The RAF Jaguar displayed, XX752 from 226OCU, showed the new style of underwing serial presentation, with the identification under the port wing only. USAF participation came from a pair of A-10 Thunderbolt IIs and the Royal Navy put in Firefly 5 WB271 from Yeovilton. The RAF Falcons team dropped from Puma ZA938 and the 'Red Arrows' support aircraft was Jetstream XX497, both occasioned by the shortage of Hercules with so many on the Falklands route.

The Air Britain International Fly-in to Old Warden on 11 July featured a reunion of aircraft that have won the Kings Cup Air Race

over the years since it was inaugurated in 1922. The response to the many personal invitations sent out by organiser Bernard Martin was very good and resulted in at least five actual winners and a number of representative winners and participants turning up. The oldest winner was the Mew Gull G-AEXF (1938) while prewar representatives were Puss Moth G-ABLS (a 1932 entrant), Blackburn B-2 G-AEBJ, Gipsy Moth G-AAMY, and Leopard Moth G-ATFU. Postwar winners were Chipmunks G-AKDN and 'PTS, Turbulent G-APNZ, Nipper G-APYB and representative aircraft were Gemini G-AKKH, Proctor G-ALJF, Tiger Moth G-ADXT and Taylorcraft/D G-AIXA. Travelling furthest to attend the reunion was 1970 winner Citabria N7566F, which is now based in Austria as OE-AHE. It was accompanied to Old Warden by a type seldom seen in the UK, Meteor FL55 OE-DBS from the Austrian Vintage Club. Other fly-ins on the same day at Popham and Sandown did not attract such exotic visitors, although the Isle of Wight event did see German Jodel D-EFFB, Gipsy Moth G-ABEV, Harvard FT229, and EMK Aeroplane's recently completed Pitts G-LINT.

Looking ahead now to events in the coming four weeks it is of course the SBAC Show at Farnborough that brings us to the climax of the 1982 season. It follows the usual pattern of a Press preview day on Sunday 5 September, followed by trade days and full public displays at the end of the week. 1982 will see more new aeroplanes at Farnborough than for many years previously and promises to be a memorable event. The RAF's Battle of Britain displays have been divided across the weekends before and after the SBAC Show. RAFs Finningley and Leuchars will be open on 4 September, St Athan and Abingdon two weeks later. The RAF Finningley display will also feature the Diamond Jubilee Kings Cup Air Race. For vintage enthusiasts the big event will be Duxford's Vintage Flying Day on 5 September when the Shuttleworth Collection and the Imperial War Museum get together to present a joint programme. There will also be vintage displays at Scone, Perth on 29 August, Old Warden on the same day, at Strathallan on 5 September and the annual Science Museum Open Day at Wroughton on 12 September. Hot-air balloons will also be much in evidence with the Bristol International Balloon Fiesta on 20-22 August (note the change of date from that previously given) and the British National Championships at Sudeley Castle, Glos on 5-11 September.

The following events are scheduled to take place during the next four weeks. Readers are reminded that they should check with the organisers that any event they plan to attend is taking place on the date and at the venue shown and that it is open to the public.

August

- 14 RAF Alconbury, Cambs: USAFE Open Day
- 14 Newtownards, Co Down: Ulster Air Show

- 14 Aberporth, Dyfed: Red Arrows at ATC Open Day
- 14 Coventry, West Midlands: Air Race
- 15 Coventry, West Midlands: RAFA Midlands Air Display
- 15 Jurby, IoM: Air Display
- 18 Weymouth, Dorset: Red Arrows at Weymouth Carnival
- 18 Broadstairs, Kent: Red Arrows at Broadstairs Water Gala
- 18 Cromer, Norfolk: Red Arrows at Cromer Carnival
- 19 Southport, Lancs: Red Arrows at Southport Flower Show
- 19 Blackpool, Lancs: Red Arrows at RAF Town Show
- 20-22 Ashton Court, Bristol, Avon: International Balloon Fiesta
- 21 Hoylake, Cheshire: Red Arrows at Lifeboat Day
- 21 Skegness, Lincs: Red Arrows at Skegness Carnival
- 21-22 Barton Aerodrome, Manchester: Garden Party
- 22 Lincoln: Red Arrows at Lincoln Steam Spectacular
- 22 Rochester, Kent: Air Display and Kent Messenger National Air Race
- 22 Castle Mill, Beds: International Auster Pilots Club Fly-in
- 22 Woburn Abbey, Beds: D. H. Moth Club Meeting
- 22 Fairstair Racecourse, Co Meath: Aer Rianta Air Spectacular
- 26 Dartmouth, Devon: Red Arrows at Dartmouth Royal Regatta
- 27 Sidmouth, Devon: Red Arrows at Sidmouth Regatta
- 27-28 East Midlands Airport, Castle Donington: International Fly-in, British Women Pilot's Association
- 27-29 Oxford Airport, Kidlington, Oxon: International Air Rally
- 28 RAF Binbrook, Lincs: RAF Open Day & Air Display
- 28 Teesside Airport: Teesside Air Show
- 28-29 Crich, Derby: Transport Extravaganza
- 28-29 Nottingham Airport, Tollerton, Notts: Air Show
- 28-30 Finmere, Bucks: Vintage Aircraft Club Summer Camp
- 28-30 Popham, Hants: Microlight Weekend
- 28-30 Portsmouth, Hants: HM Dockyard Navy Days
- 28-30 Plymouth, Devon: HM Dockyard Navy Days
- 29 Leicester East: Air Display, Leicester Aero Club
- 29 Scone, Perth: Scottish Aircraft Collection Air Display
- 29 Old Warden, Beds: Shuttleworth Informal Flying Occasion
- 29-30 Essex Show Ground, Chelmsford: Battle-Attack Air Show
- 30 Halfpenny Green, Staffs: Air Display
- 30 Eye, Suffolk: Red Arrows at Eye Show
- 30 Peterborough, Cambs: Red Arrows at Expo 82
- 30 Oulton Broad, Suffolk: Red Arrows at Oulton Broad Regatta
- 30 St Albans, Herts: RAF Displays at St Albans Carnival

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How to enter

As was announced in last month's issue, *Aircraft Illustrated*, in association with the

Marlborough Aerobatic Team, is running a photographic competition on 'Army Air 82' and its Heli-Meet-related events. All you have to do is select your best photographs of the occasion and send them to the address shown below. Remember that merit will be given for the originality and composition of the photographs. All entries should be in the form of either black & white prints (approximately sized 8" x 6") or colour transparencies (35mm or larger); in judging the winning photograph, no preference will be given to either colour or black & white entries. Photographs should be sent, in accordance with the rules to: **Photo Comp, Aircraft Illustrated, Ian Allan Ltd, Terminal House, Shepperton, Middx TW17 8AS.**

Competition rules

1. Entrants should submit no more than five black & white prints and/or five colour transparencies. The photographer's name

and address should be written on the back of all the prints and transparency mounts, together with brief caption details. Entries can only be returned if accompanied by a stamped-addressed envelope.

2. All photographs are submitted at the owner's risk and Ian Allan Ltd cannot be held responsible for any loss or damage of material, howsoever caused.

3. The competition is not open to full-time photographers, those earning a living from aviation journalism, members of the press or any employees of Ian Allan Ltd.

4. Entries will be judged by the editors of *Aircraft Illustrated* and their decision will be final. No correspondence regarding the results will be entered into.

5. The closing date for the competition is 30 September 1982, and the results will be announced shortly thereafter.

6. The copyright of the photograph remains with the photographer but Ian Allan Ltd retains the right to reproduce the winning entries in a future edition of *Aircraft Illustrated*.

September

- 3 RAF Finningley, S Yorks: Stewards Cup National Air Race
- 4 RAF Finningley, S Yorks: Battle of Britain Open Day and King's Cup Air Race
- 4 RAF Leuchars, Fife: Battle of Britain Open Day
- 4 RAF Sealand, Clwyd: RAF Open Day
- 4 RAF Marham, Norfolk: Families Day
- 4 RAF Northolt, Gtr London: Families Day
- 5 Sandown, IoW: British Aircraft Fly-in
- 5 Duxford, Cambs: Vintage Flying Day
- 5 Inverness, Highlands: Highland Air Show
- 5 Kirkwall, Orkney: Open Day & Red Arrows Display
- 5 Strathallan Airfield, Auchterarder, Perthshire: Flying Day
- 5-11 Dunstable, Beds: Vintage Glider Week & Competition
- 5-11 Sudeley Castle, Glos: British National Hot Air Balloon Championships
- 5-12 Farnborough, Hants: SBAC International Exhibition and Flying Display
- 8 Abingdon, Berks: Red Arrows at ex-PoW Reunion
- 12 Wroughton, Wilts: Science Museum Open Day
- 12 Popham, Hants: Piper Rag & Stick Fly-in

For some of this month's contributions we would like to thank: R. Bonser, D. Conway, J. Guthrie, I. MacFarlane, A. P. March, K. A. Saunders, E. A. Shackleton, and R. Wright. Also the publications: *Air North*, *Air Scotland*, *Aviation Ireland*, *British Aviation Review*, *Cotswold Messenger*, *Flightpath*, *Hawkeye*, *Humberside Air Review*, *Irish Air Letter*, *Prestwick Airport Letter*, *Scottish Air News*, *Skyward*, *South West Aviation News*, *Stansted Aviation Newsletter* and *Vintage News*.

photoview



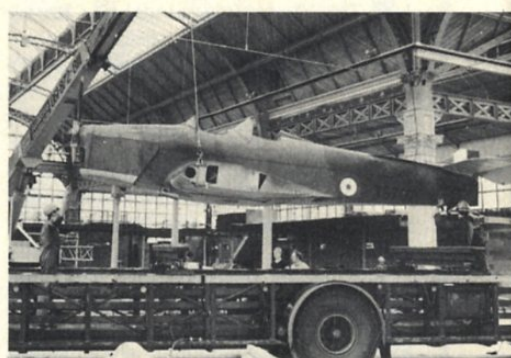
Above: One of the Science Museum's latest acquisitions is Lockheed 10 Electra, N5171N, which was flown in to Wroughton on 21 June 1982. The aircraft was previously owned by the Wings and Wheels Collection in the US, and it is believed that the Science Museum will repaint the Electra in the livery of Eastern Airlines, its original owner.

Photo: Edwin Shackleton

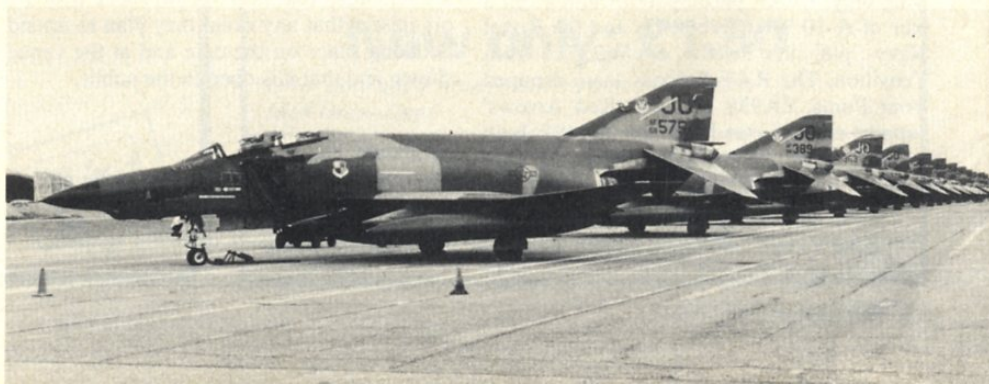
Right: Manchester's new Air and Space Museum received its first aircraft, Miles Magister 1, T9707, on 15 July. The new museum, which is due to open next Easter, is housed in the City Hall that is being restored at a cost of £2.2million. Photo: Dr Alan Curry

Below: Line-up of 18 USAF RF-4Cs of the 62nd TRS/363rd TFW from Shaw AFB, SC photographed during a deployment to RAF Alconbury between 20 May-22 June.

Photo: Roger Wright



Right: A newcomer to the UK airshow-scene in 1982 is Stephen Grey's superbly finished F-8F Bearcat, NX700H. Photo: Peter R. March



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